Essential Hypertension among Egyptian Adults

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ABSTRACT

Background: hypertensive diseases represent a major disease burden in Egypt. The prevalence of hypertension in Egypt in 2008 among adults of age ≥ 25 was 17.6%. In 60% of patients, hypertension is usually associated with cardiovascular risk factors. This leads to increased cardiovascular morbidity and mortality. Management of hypertension in Egypt is not easy because of treatment costs and inefficient primary health care system. There is a need for developing national hypertension guidelines to improve the rates of awareness, treatment and control of hypertension with the final goal of preventing and decreasing mortality and morbidity.

Aim of work: to assess the essential hypertension status among the Egyptian adult population of age≥ 25 and to study the modifiable social and environmental risk factors, health consequences, and assess the cardiovascular and non-cardiovascular complications to help disease prevention and limitation of complications.

Patients and methods: this study was conducted on 312 patients of age ≥ 25 with essential hypertension. All patient were subjected to full medical history and physical examination that including measurement of blood pressure (BP) and fundus examination. Anthropometric measurements including height, weight, waist circumferences, and hip circumferences were also measured. Waist to hip ratio and body mass index (BMI) were calculated. Laboratory investigations were performed including complete blood count (CBC), fasting blood glucose, measurement of creatinine, uric acid and lipid profile. Microalbuminuria was also assessed. Other investigations including electrocardiogram and echocardiograph were done.

Results: Male patients were 134(42.9%), while females were 178(57.1%). Their ages ranged from 30 to 85 years with a mean ±SD of 55.16±9.4years.Dyslipidemia was found in 152 (49%) patients. Left ventricular diastolic dysfunction (LVDD) was represented in160 (51%) patients. Uncontrolled BP was represented in (73%), (66%) and (55%) of non-educated, mild to moderate educated and high educated patients respectively. Retinopathy was found in 121 (38.8%) patients, 76 (60%) patients were hypertensive diabetic and 45 (24%) patients were hypertensive non-diabetic. Albumin in urine was present in 20%of patients.

Conclusion: strategies that enhance public awareness of hypertension and increase access to affordable medications are urgently needed. Prevention of hypertension needs both a population strategy and an intensive strategy focused on individuals at high risk. The complications of hypertension can be prevented by adequate blood pressure control with screening programs to identify the population at risk

Key words: Essential Hypertension, Risk factors, Complications, Egyptian Adults

INTRODUCTION

Hypertension is a chronic medical condition in which the systemic arterial blood pressure is elevated. Hypertension in adults is identified when the average of two or more diastolic blood pressure measurements on at least two subsequent visits is ≥90 mmHg, and / or systolic blood pressure ≥140 mmHg.[(1)]

It is the most common condition seen in primary health care and leads to myocardial infarction, stroke, renal failure, and death if not detected early and treated appropriately.[(2)]

There are many factors contribute to raise of blood pressure such as sedentary lifestyle, stress, potassium deficiency, obesity, elevation of renin,

Sodium sensitivity, alcohol intake, vitamin D deficiency, aging, some inherited genetic mutations, family history, Insulin resistance and sympathetic nervous system over activity.[(3)]

In some countries, there are unusual hypertension risk factors, such as schistosomiasis in Egypt, which is linked to hypertension through its effect on the urinary tract. Environmental pollution in the form of excessive noise, or lead pollution may

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contribute to the rise of blood pressure in some communities. [4]

Adoption of western life style, increase rates of obesity, cigarette smoking and other cardiovascular risk factors are important contributing factors.[5]

Although many guidelines provide evidence-based recommendations for the management of high BP, these recommendations are not a substitute for clinical judgment, and decisions about care must consider the clinical characteristics and circumstances of each individual patient**.** [1]

Hypertension is classified as either primary (essential) or secondary. About 90–95% of cases are termed "primary hypertension", which refers to high blood pressure for which no medical cause can be found. The remaining 5–10% of cases "Secondary hypertension" is caused by other conditions that affect the kidneys, arteries, heart, or endocrine system. [6]

PATIENTS AND METHODS

This study was conducted on 312 patients with essential hypertension. Patients were selected randomly from Outpatient Clinics of Internal Medicine, Al-Zahraa University Hospital, Cairo, Egypt.

Inclusion criteria: Adult ≥ 25 years, from both sexes, with essential hypertension. Hypertension is considered to be present when systolic blood pressure is 140 mmHg or more, and / or their diastolic blood pressure is consistently 90 mmHg or more after at least two consecutive BP readings, or if they were currently taking antihypertensive medications. [1]

Exclusion criteria: Patients diagnosed to have secondary hypertension; secondary to chronic renal disease, endocrine disorder or under steroid medications.

An informed consent was taken from all participants in this study.

All patient were subjected to:

Full medical history including; personal, socioeconomic, demographic and medical data. The socioeconomic status was assessed according to El-Gilany et al.[7]The physical activity was assessed according to Topolski et al.[8]Duration of discovery of hypertension, dietary assessment, awareness of hypertension according to Chobanian et al.[9]and patient's compliance to medications evaluated according to Strelec et al.[10]Patient's history or symptoms of other diseases, current medications, family history, and symptoms suggesting secondary hypertension, education level, history of smoking or any drugs use was taken.

Physical Examination including:

General and systemic examination, assessment of body mass index and waist/hip ratio, Blood pressure (BP) measurement and fundus examination.

Laboratory investigations including:

Complete blood count (CBC), complete urine analysis and quantitative measurement of microalbuminuria in single voided urine, using DRG microalbuminuria ELISA (EIA-2361) method.

Serum creatinine, serum uric acid, fasting blood glucose, complete lipid profile by using (Obas C311) automated systems (Roch diagnostic).

Other investigations including

Electrocardiogram and Echocardiography.

Statistical Methods:

Quantitative variables studied are summarized using the number of cases, the mean as a measure of central tendency, the median for widely dispersed variables and the standard deviation as a measure of dispersion. Categorical variables are expressed as percentages.

Quantitative variables were compared using unpaired t-test and one-way ANOVA test.

Qualitative variables were compared using Chi square and test of proportion.

The P value of less than 0.05 was considered as statistically significant.

RESULTS

This study was conducted on 312 patients with essential hypertension. The age of the studied patients ranged from 30 to 85 years, with a mean ±SD of 55.16±9.4years. Mean± SD of age of males was 56.3±8.6; mean ±SD of age of females was 53.4±9. 5years. **(Table 1)**

185 (59.3%) patients were of low socioeconomic level (SEL), while 94 (30.1%) patients were of middle SEL and 33 (10.6%) patients were of high SEL. **(Table 4)**

149 (48%) patients were mild to moderate educated, while132 (42%) not educated and 31 (10%) patients were highly educated. **(Table 4)**

209 (67%) patients were living in slum urban areas, while 56(18%) patients were living in urban areas, and 47(15%) patients were from rural areas. **(Table 1)**

Hypertension was accidentally discovered in 38(12.2%) patients, duration of hypertension was <1year in 11(3.5%) patients, 1-5years in 112(35.9%) patients, and >5years in 151 (48.4%) patients. **(Table 1)**

One hundred seventeen (38%) patients were aware of their disease, taking antihypertensive medication but not controlled. While 57(18%) patients were aware about their disease but they were not taking antihypertensive medication. One hundred (32%) of patients were treated and controlled, and 38 (12%) patients were discovered accidentally.**(Table 1) (Fig. 1)**

After exclusion of recently discovered patients, 112(39%) patients were adherent to the treatment and 152(49%) patients were not adherent.

Regarding to socioeconomic state; 135 (73%) patients of low socioeconomic level (SEL) had uncontrolled BP, while 54(57%) patients of middle SEL had uncontrolled BP. This results were statistically significant ($P<0.05$), while there was no statistically significant difference in patients of high SEL regarding BP control. **(Table4)**

Uncontrolled BP was represented in (73%), (66%) and (55%) of non- educated, mild to moderate educated and high educated patients respectively. Smoking was present in 83(26.6%) patients, all of them were males. High salt intake was present in 130 (41.7%) patients and high fat intake was present in 85 (27.2%) patients. Moderate physical activity was present in 215(69%) patients, while 86 (27%) patients were sedentary and 11 (4%) patients were active. **(Table4)**

One hundred patients (32%) were treated and had controlled BP (<140/90), while 212 (68%) patients had uncontrolled BP (≥140/90). **(Table 4)**

The mean ±SD of body mass index (BMI) of the patients was 29.5±4.2 kg/m2. It was significantly higher in females (31.4±4.2)kg/m2 than in males (27±2.5) kg/m2 ($P<0.05$) and W/H ratio was 0.92±0.18, it was significantly higher in females (0.92±0.12) than males (0.86±0.06) ($P<0.05$). Overweight was present in 147(47%) patients, males compromise 59%of them, while females represent 41%.Obesity was present in 120(38.5%) patients, most of them were females 106(88.3%). **(Table2)**

Regarding to laboratory results their mean (±SD) fasting blood sugar (FBS) was 165.14±78mg/dl, Total cholesterol was 217±34.4mg/dl, HDL 37.5±7.4, HDL/LDL ratio was 0.31±0.09,triglycerides was 161.3±47.5mg/dl, serum creatinine was 1.1±0.28 mg/dl and serum uric acid was 6.1±1.4mg/dl.**(Table3)**

Dyslipidemia was present in 152 (49%) patients followed by hyperuricemia 129(41%) patients and diabetes 126 (40.4%) patients. **(Table5)**

Left ventricular diastolic dysfunction (LVDD) was present in 160 (51%) patients; left ventricular systolic dysfunction (LVSD) was present in 50(16%) patients, while obvious heart failure was present in 28(9%) patients. History of cerebral stroke or transient ischemic attacks was present in 22(7%) patients. **(Table5)(Fig. 2)**

Retinopathy was found in 121 (38.8%) patients, 76(60%) patients was hypertensive diabetic and 45 (24%) patients was hypertensive non-diabetic. **(Table6)**

Beta blockers (β-blockers) was the most common used monotherapy 51(16.3%)patients, while angiotensin-converting-enzyme inhibitor (ACE inhibitors)+ Diuretics was the most common used combined therapy55(17.6%) patients.**(Table7)**

DISCUSSION

Hypertension is a major public health problem that affects approximately one billion individuals worldwide. However, the prevalence of hypertension shows a significant variability among different countries. Most patients with hypertension have many risk factors including lipid abnormalities, glucose intolerance or diabetes, family history of early cardiovascular events, obesity and cigarette smoking. [11]

The success of treating hypertension is limited, and despite well-established approaches for diagnosis and treatment, in many communities fewer than half of all hypertensive patients have adequately controlled blood pressure. [11]

This study was attempted to evaluate the effect of socioeconomic status, awareness, education level on BP control in adult Egyptian hypertensive patients and assessment of cardiovascular risk factors and other non-cardiovascular complications in aiming to develop plans and measures for primary prevention and control of hypertension.

About 57.1% of patients were females, higher rates of awareness among females may contribute for this higher percentage as the study showed that (46.3%) of women were more aware of their diagnosis compared to men (28.0%), and control rates were higher in women than in men (10.9%

and 4.8%, respectively). This is in accordance with Ahmed **et al.** [12] who showed the same prevalence 15.8 %, 19.3 % in male and female respectively.

Most of the studied patients were living in slum urban areas (67%), and only (15%) were coming from rural areas. This support the hypothesis that hypertension is more prevalent in urban and semi-urban regions than in rural areas. [13]

Urbanization affects food consumption patterns, with increased consumption of fats, oils, and animal-based foodstuff. This diet change can increase body weight, which is an independent risk factor for the development of hypertension. In addition, reduced physical activity and increased psychological stress are contributing factors. [14]

Most of the studied patients were of low social standard and 132 (42%) of patients were not educated. **Chow *et al.*** [15] found that Low education was associated with lower rates of awareness, treatment, and control in low-income countries, but not in other countries.

In this study, 38% of hypertensive patients were aware of their disease taking medications but uncontrolled , 32% of patients were treated and controlled, 18% of patients were knowledged but not taking medication, while 12%were discovered accidentally .Only 39% of all patients were adherent to treatment.

Most of non- educated patients (73%) had uncontrolled BP ($P<0.05$), while there were no significant differences in BP control in high educated patients ($P>0.05$).

Although data from other countries observed lower levels of awareness, treatment and control in rural areas and among the less wealthy; a study done by Ahmed ***et al.*** [12] in Egypt found that the wealthiest had the highest awareness rate, but interestingly, lower levels of education were associated with improved awareness. In addition, they observed no rural-urban differentials .In Egypt, the entire population is entitled to government health services, the widespread coverage available even in rural areas might be a contributing factor for health equalization

In this study, high salt intake was found in 41.7% of patients and high saturated fatty diet in 27.2% patients. Reducing salt intake to less than 5 grams of salt per day can result in a decline in both systolic and diastolic blood pressure of > 10 mmHg, and decrease in salt consumption of 3 grams per day would result in a reduction of 22% and 16% in stroke and ischemic heart disease deaths, respectively. [16]

Smoking was present in (26.6%) of the patients, all of them were males .Smoking in hypertensive patients can markedly increase the risk of secondary cardiovascular complications and enhance the progression of renal insufficiency. C-reactive protein (CRP) levels and white blood cells (WBC) counts are higher among current smokers compared to never smokers. Positive, independent relationships between the number of cigarettes/day and elevated levels of CRP and WBC counts have been described. ([17]

In the present study; 69%were moderate active, 27% of patients were sedentary and only 4% of patients were active.

Obesity was present in 38.5% of hypertensive patients, 88.3% of them were females.

An intervention study was carried out on 348 hypertensive patients attending five accredited health centers in greater Cairo from May 2007 to March 2008; after submission for 3 months to an educational program about lifestyle modifications. The results revealed that modifying life style had a direct beneficial effect on lowering both systolic and diastolic blood pressure, weight & lipid profile of the studied cases, minimizes the use of Anti-hypertensive medications. [18]

Diabetes was a common co-morbidity of the hypertensive patients. (40%) of hypertensive patients had diabetes. Up to 75% of adults with diabetes also have hypertension and patients with hypertension alone often show evidence of insulin resistance. Thus, hypertension and diabetes are common, intertwined conditions that share a significant overlap in underlying risk factors and complications. [19]

In the present study, dyslipidemia was present in (49%) of patients. Dyslipidemia was significantly higher in uncontrolled hypertensive patients than in controlled hypertensive patients and in hypertensive diabetic than in hypertensive non-diabetic patients ($P<0.05$). In a study by **Jani *et al.*** [20] among patients with controlled BP, dyslipidemia was recorded in 23% of them while it recorded in 67% of those with uncontrolled BP

In WHO survey 2008 in Egypt; hypercholesterolemia was present in 38.6% of the total population, 33.3% of them were males and 43.7% of them were females. [21]

Albumin in urine was present in 20% of patients that was significantly more in uncontrolled patients than in controlled hypertensive patients.

These results were lower than that of **El-Minshawy and Osman,** [22] they studied two hundred and forty one essential hypertensive patients in Minia city, microalbuminuria was present in 31% of patients and macroalbuminuria in 10%.

Albuminuria is a risk marker for prediction of the progression of nephropathy and may reflect hypertensive injury to the kidney so it should be assessed regularly to monitor the impact of antihypertensive therapy. [23]

In a study by **Adekunle *et al*.** [24]left ventricular hypertrophy **(**LVH) was the most powerful cardiovascular risk factor in predicting the occurrence of heart failure, stroke, myocardial infarction and death in patients with hypertension .

In the present study, LVH was present in 37% of hypertensive patients, with no significant difference between controlled and uncontrolled patients or between hypertensive diabetic and hypertensive non-diabetic patients (P>0.05).This result was higher than that predicted by **Ibrahim *et al*.**[25]LVH was 19.2% of hypertensive men, 16.2% of hypertensive women but approaching results of an Italian study (36%-43%). [26]

In the present study, LVDD was present in 51% of hypertensive patients. It was significantly more in uncontrolled hypertensive patients than controlled group (P<0.05) and in hypertensive diabetic patients than hypertensive non -diabetics (P<0.05).

The level of diastolic dysfunction appears to correlate with increasing severity of hypertension, and peak myocardial systolic strain rate may be an independent factor in the extent of LV remodeling and diastolic function. [27]

This fact is extremely important because early recognition of diastolic dysfunction may help in the evaluation and management of the hypertensive patients.

Left ventricular systolic dysfunction was present in 16% of hypertensive patients, HF was found in 9% of patients and coronary artery disease was present in 39% of patients.

These results were significantly higher in uncontrolled than controlled hypertensive patients and in hypertensive diabetic than hypertensive non- diabetic patients. A study by **Sharaf *et al*.**[28]in Egyptian hypertensive patients, ECG assessed LVH was present in 20%, coronary artery disease 16% and systolic heart failure 5%.

In the present study retinopathy was present in 39% of patients, it was significantly higher in uncontrolled hypertensive patients than in controlled hypertensive patients and in hypertensive diabetic (60%) than in hypertensive non-diabetic patients (P<0.05). Routine ophthalmoscope evaluation of the retina is recommended and supported by the JNC7. [9]

Grade III and grade IV retinopathy are considered a target-organ damage and an indicative of severe hypertensive retinopathy, with a high predictive value for mortality. [25]

The present study showed that B-blockers (BB) were the most common used monotherapy (24%) while calcium channel blockers as well as diuretics had low frequency of use (6%). Guidelines for hypertension management [25]recommended the use of diuretics as initial monotherapy particular in elderly patients , B-blockers are recommended in the presence of coronary artery disease , channel blockers are recommended in elderly patients, in presence of angina, while angiotensin converting enzymes inhibitors and angiotensin receptor blockers (ACEIs and ARBs) are recommended in diabetic patients and in presence of proteinuria.

Conclusion

Physician education and implantation of national guidelines should be encouraged to prevent irrational use of available resources since doctors will treat hypertension according to their daily experience and according to the advice of drug industry representatives.

The world Hypertension League and the International Society of Hypertension recommended that national hypertension societies should develop their own guidelines that will adapt to the local circumstances and can be applied by the majority of clinicians in their everyday practice in their individual countries.

At the same time, it is necessary to support health care systems to develop cost-effective services for primary prevention and control of hypertension in primary health care settings.

We found that being overweight or obese, having raised cholesterol, older age group; sedentary lifestyle, smoker, and having impaired glucose level were associated with hypertension

These clustering of the risk factors is important to note, as reducing one (of the risk factors) may also influence the prevalence of the others.

The study had certain limitations. Subjects for the study were chosen from a single locality and thus they may not be representative of affluent subjects throughout Egypt.

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Table (1) Socio-demographic data of the hypertensive patients

Age (years) mean ±SD Male Female	30-85 (55.16±9.4) 56.3±8.6 53.4±9
Sex Male Female	 134(42.9%) 178 (57.1%)
Address: Urban Slum urban Rural	 56 (18%) 209(67%) 47 (15%)
Duration of hypertension Recent discovered Less than 1 year 1-5years More than 5 years	 38 (12.2%) 11(3.5%) 112 (35.9%) 151(48.4%)
Awareness of hypertension Unaware Knowledged, untreated Treated, controlled Aware, uncontrolled	 38(12%) 57 (18%) 100 (32%) 117 (38%)
compliance to treatment: Adherent Non- adherent Unaware	 122(39%) 152(49%) 38(12%)

Table (2) Anthropometric measures of the hypertensive patients

Anthropometric measures	Males	Females	P value
Mean ±SD -BMI(kg/m2)	27.3±2.5	31.4±4.2	<0.05
W/H ratio	0.86±0.06	0.92±0.12	<0.05
Overweight -BMI>25kg/m2	87(59%)	60(41%)	<0.05
Obesity -(BMI≥ 30 kg/m2)	14(11.7%)	106(88.3%)	<0.05

BMI: Body mass index, W/H ratio: Waist hip ratio
P-value < 0.05 is significant and P-value>0.05 non-significant

Table (3) Laboratory results of the hypertensive patients

Laboratory test	**Mean±SD**
FBS(mg/dl)	165.14±78
Total cholesterol(mg/dl)	217±34.4
HDL(mg/dl)	37.5±7.4
HDL/LDL ratio	0.31±0.09
TG(mg/dl)	161.3±47.5
S.creatinine(mg/dl)	1.1±0.28
S.uric acid(mg/dl)	6.1±1.4

FBS: Fasting blood sugar, HDL: high density lipoproteins, LDL: low density lipoproteins, TG: triglycerides

Table (4) clinical and demographic data of Controlled and Un- controlled hypertensive patients

Clinical and demographic data	Number of patients (%)	Controlled	Un-controlled	P value
Socioeconomic level:				
Low	185 59.3%)	50(27%)	135(73%)	<0.05
Middle	94 (30.1%)	40(43%)	54(57%)	<0.05
High	33 10.6%)	10(30%)	23(70%)	> 0.05
Education:				
Not educated	132 (42%)	35(27%)	97(73%)	<0.05
Moderate	149 (48%)	51(39%)	98(66%)	<0.05
High	31 (10 %)	14(45%)	17(55%)	> 0.05
Habits				
Smoking	83 (26.6%)	20(24%)	63(76%)	<0.05
High salt diet	130 (41.7%)	31(24%)	99(76%)	<0.05
High fatty diet	85 (27.2%)	22(26%)	63(74%)	> 0.05
Physical activity				
Sedentary	86 (27%)	7(8%)	79(92%)	<0.05
Moderate	215 (69%)	88(41%)	127(59%)	<0.05
Active	11 (4%)	5(45%)	6(55%)	> 0.05
BP	312 (100%)	100 (32%)	212(68%)	<0.05
Obesity (BMI≥ 30 kg/m2)	120 (38.5%**)**	24(20%)	96(80%)	<0.05

P-value < 0.05 is significant and P-value>0.05 non-significant

Table (5) Hypertension Co morbidities, target organ damage, cardiovascular risk factors and BP control

Comorbidity	Number of patients (%)	Controlled	Uncontrolled	*P-value*
Hyperuricemia	129 (41%)	16(16%)	113(53%)	< 0.05
Albuminuria	61 (20%)	5(5%)	56(27%)	< 0.05
Dyslipidemia	152 (49%)	36(36%)	116(55%)	< 0.05
Diabetes	126 (40%)	25(25%)	101(48%)	< 0.05
LVH	116 (37%)	31(35%)	85(40%)	>0.05
LVDD	160 (51%)	35(35%)	125(59%)	<0.05
LVSD	50 (16%)	7(7%)	43(20%)	<0.05
CAD	123 (39%)	28(28%)	95(45%)	<0.05
Retinopathy	121 (39%)	30(30%)	91(43%)	<0.05
Cerebrovascular insufficiency/stroke	22 (7%)	6(6%)	16(8%)	>0.05

P-value < 0.05 is significant and *P-value*>0.05 non-significant

Table (6) Complications, risk factors and target organ damage in diabetic hypertensive and non-diabetic hypertensive patients

Variables	Number of patients (%)	Hypertensive Diabetics (n=126)	Hypertensive Non-diabetics (n=186)	*P-value*
Dyslipidemia	152 (49%)	89(70.6%)	63(34%)	<0.05
Albuminuria	61 (20%)	25(19.8%)	36(19.4%)	> 0.05
LVH	116 (37%)	49(39%)	67(36%)	>0.05
LVDD	160 (51%)	89(71%)	71(38%)	< 0.05
LVSD	50 (16%)	30(24%)	20 (11%)	< 0.05
CAD	123 (39%)	60(48%)	63(34%)	<0.05
Retinopathy	121 (39%)	76(60%)	45(24%)	< 0.05
Cerebral insufficiency	22 (7%)	12(10%)	10(5%)	>0.05

P-value < 0.05 is significant and *P-value*>0.05 non-significant

Table (7) Frequency of drugs used

Drug class	Number of patients	%
BB	51	24%
ACEI	40	18%
CCB	13	6%
Diuretic	12	6%
ACEI+Diuretic	55	25%
BB+ACEI	27	12%
ACEI+Diuretic+BB	15	7%
ACEI+Diuretic+CCB	4	2%

BB=Beta-blocker, ACEI=Angiotensin converting enzyme inhibitors, CCB=Calcium channel blocker.

Figure 1: Patients' awareness of hypertension

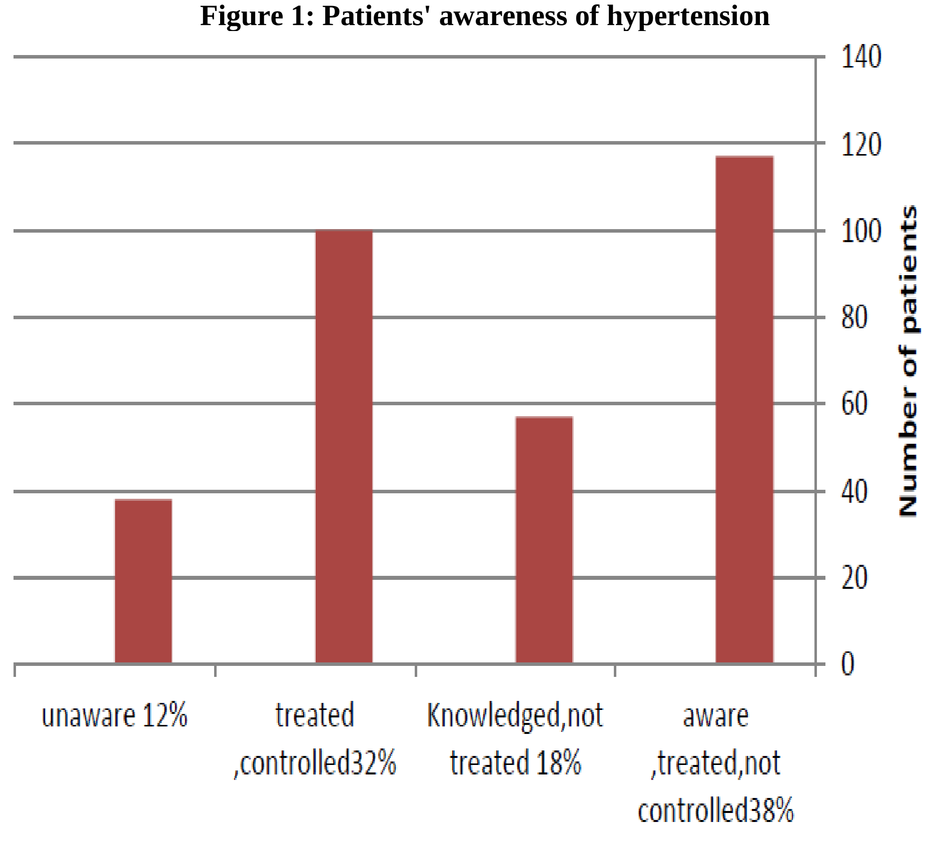

Figure 2: Co-morbidities and target organ damage in hypertensive patients

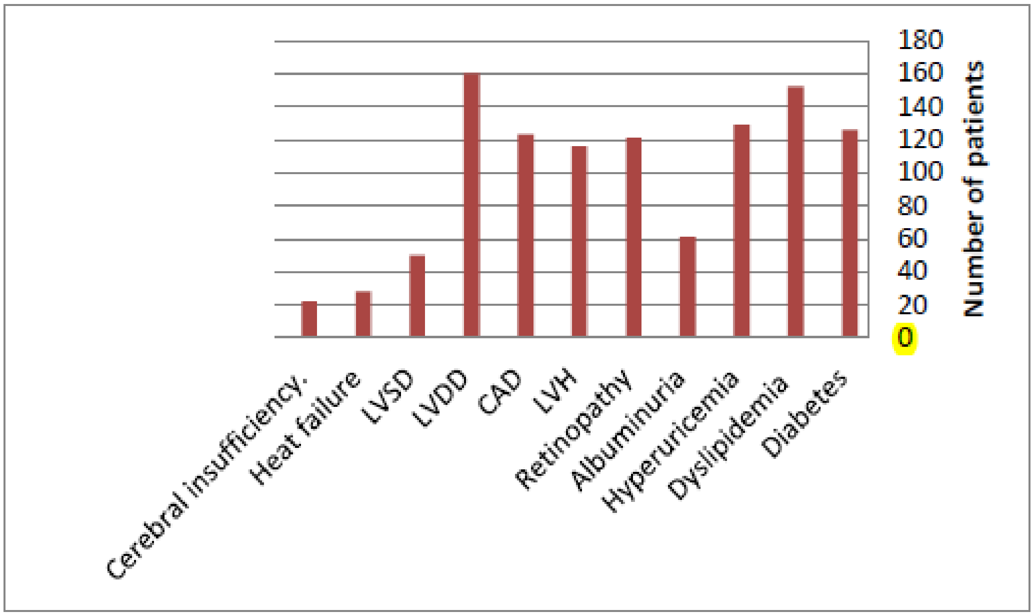

Figure 3: Duration of hypertension