

DEGREE OF HYPERTENSION CONTROL AT NON COMMISSION OFFICER'S HEALTH CENTER (NCOHC) POPULATION COMPARED TO OFFICER'S HEALTH CENTER (OHC) AND MEASURING THE TREND OF DOCTORS TOWARD CHANGING TREATMENT

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ABSTRACT

Background: The treatment of the hypertensive patient has as its primary goal to reduce hypertension-induced morbidity and mortality. Current strategies include individual risk assessment, taking into account not only blood pressure values, but also other cardiovascular risk factors and the presence of organ damage. Type and intensity of treatment approach vary according to the level of risk. In 2003, The Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) listed 66 antihypertensive drugs with 27 combinations (24 with a diuretic) for treating patients with systemic hypertension.

Aims & Objective: The aim of this study was to review the degree of hypertension control at NCOHC general clinics in comparison to OHC general clinics and to evaluate the trend of physicians towards changing treatment to achieve the optimum control of hypertension according to JNC7 guidelines.

Materials and Methods: This is a retrospective analysis of medical files of 208 hypertensive patients; this study was conducted at the NCOHC & OHC, which are peripheral clinics of Riyadh Military Hospital. All files were collected for the patients with hypertension in the two clinics (208) which was accepted through research committee of the hospital. The files of the two clinics were viewed separately, and the data was analyzed.

Results: All medical files of 208 hypertensive patients were analyzed, 79 and 129 patients at OHC and NCOHC respectively, including age, sex, mean blood pressure, drugs used, and trend of physicians to change or add medication to maintain within normal Blood pressure. The main number of patients having blood pressure ranged between [100/80-140/80] of different age and sex were females at OHC, and the opposite is at NCOHC. And most of the patients were between ages 51-75 years. Single or compound drugs were used in different ranges of blood pressure, either due to uncontrolled blood pressure or in order to reduce the side effects of one drug leading to adding another drug. This is measured by the trend of doctors towards changing treatment, were it sometime occurs by increasing the dose or adding or changing to a new medication, or by enhancing life style modification.

Conclusion: As hypertension is a disease of multifactorial etiology, non-pharmacological means of reducing factors resulting in hypertension and uncontrolled blood pressure are as important as pharmacological means. Increasing awareness among general population about the importance of regular exercise, eating more vegetables and fruits and avoiding fat and stopping smoking is very important and cost effective.

Key Words: Hypertension; Control; JNC7 Guidelines; Doctors; Saudi Arabia

Introduction

Hypertension is a common disorder in Saudi Arabia, as the dramatic changes in lifestyle and food consumption patterns, which have led to the emergence of non-communicable disease, such as hypertension, as a public health problem in the Kingdom of Saudi Arabia^[1] affecting approximately 4,741,900 million people in which undiagnosed cases is about 1,422,570 millions.^[2] There is a statistically significant difference in the prevalence of systolic blood pressure (SBP) and diastolic blood pressure (DBP) in the different regions of the Kingdom. The prevalence pattern tends to be fairly similar to that found in the affluent societies in the Western countries.^[3]

Hypertension is a major risk factor for cardiovascular and renal disease, increasing the risk of myocardial infarction,

stroke, heart failure, and renal disease. Despite the well-established benefit of blood pressure (BP) reduction in reducing the risk of these clinical events, the rate of BP control remains poor. However, with the appropriate application of clinical data and utilization of treatment options, there is a considerable opportunity to increase levels of BP control and substantially reduce cardiovascular and renal morbidity and mortality.^[4] Controlling hypertension has been shown to reduce the relative risk of cardiovascular mortality and morbidity by 30%.^[5] In clinical trials, antihypertensive therapy has been associated with reductions in stroke incidence averaging 35–40%; myocardial infarction 20–25% and heart failure > 50%.^[6]

In 1993, the Fifth Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure

suggested the use of diuretics and β -blockers as initial therapy and the use of angiotensin converting enzyme (ACE) inhibitors, calcium antagonists, and α 1- and α - β -blockers as alternative medications.^[7]

In 1997, the Sixth Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure suggested that Clinicians should be aware of these management challenges, taking social and cultural factors into account. Guidelines are provided for management of children and women with hypertension. In older persons, diuretics are preferred and long-acting dihydropyridine calcium antagonists may be considered. Specific therapy for patients with left ventricular hypertrophy (LVH), coronary artery disease, and heart failure are outlined. Patients with renal insufficiency with greater than 1 g/d of proteinuria should be treated to achieve blood pressure goal of 125/75 mmHg; those with less proteinuria should be treated to a blood pressure goal of 130/85 mmHg. ACE inhibitors have additional renoprotective effects over other antihypertensive agents. Patients with diabetes should be treated to achieve blood pressure goal of below 130/85 mmHg. Hypertension may coexist with other conditions and may be induced by other pressor agents.^[8]

In 2003 The Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure listed 66 antihypertensive drugs with 27 combinations (24 with a diuretic) for treating patients with systemic hypertension.^[9] It provides a new guideline for hypertension prevention and management. The following are the report's key messages:

- In persons older than 50 years, systolic blood pressure greater than 140 mmHg is a much more important cardiovascular disease (CVD) risk factor than diastolic blood pressure.
- The risk of CVD beginning at 115/75 mmHg doubles with each increment of 20/10 mmHg; individuals who are normotensive at age 55 have a 90 percent lifetime risk for developing hypertension.
- Individuals with a systolic blood pressure of 120–139 mmHg or a diastolic blood pressure of 80–89 mmHg should be considered as pre-hypertensive and require health-promoting lifestyle modifications to prevent CVD.
- Thiazide-type diuretics should be used in drug treatment for most patients with uncomplicated hypertension, either alone or combined with drugs from other classes. Certain high-risk conditions are compelling indications for the initial use of other antihypertensive drug classes (angiotensin converting enzyme inhibitors, angiotensin receptor blockers,

beta-blockers, calcium channel blockers).

- Most patients with hypertension will require two or more antihypertensive medications to achieve blood pressure goal (<140/90 mmHg, or <130/80 mmHg for patients with diabetes or chronic kidney disease).
- If blood pressure is >20/10 mmHg above goal blood pressure, consideration should be given to initiating therapy with two agents, one of which usually should be a thiazide-type diuretic.
- The most effective therapy prescribed by the most careful clinician will control hypertension only if patients are motivated. Motivation improves when patients have positive experiences with, and trust in, the clinician. Empathy builds trust and is a potent motivator.
- In presenting these guidelines, the committee recognizes that the responsible physician's judgment remains paramount.^[10]

The purpose of this study is to review degree of hypertension control at Non Commission Officer's Health Center (NCOHC) general clinics in comparison to Officer's Health Center (OHC) general clinics, and reviewing the trend of physicians towards changing treatment to achieve the optimum control of hypertension according to JNC VII guidelines.

Materials and Methods

This study was conducted at the Non Commission Officer's Health Center (NCOHC) and Officer's Health Center (OHC), which are peripheral clinics of Riyadh Military Hospital. NCOHC is about 30 km drive from the main hospital, at ALKHARJ road, serving about 12000 population and the number of hypertensive patients already diagnosed 140 patient at period of study (January 2005 to January 2006), OHC is about 5 km drive from the main hospital, at king Abdul Aziz road, serving about 8000 population and the number of patients diagnosed hypertension 100 patient during the same period of the study. All files were collected for the patients with hypertension in the two clinics (208) which was accepted through research committee of the hospital. The files of the two clinics were viewed separately, and the data was analyzed. An Excel program was used to enter, formulate, calculate, filter the raw data and produce the tables. Data comparisons with respect to the two clinics and differences between means of paired data were analyzed by t-tests whilst further multiple comparisons were done by one way analysis of variance (ANOVA) with post-tests (Dunn's and Bonferroni's Multiple Comparison test) P values < 0.05 were considered statistically significant.

Results

This is a retrospective analysis of medical files of 208 hypertensive patients, 79 and 129 patients at OHC and NCOHC respectively, including age, sex, mean blood pressure, drugs used, and trend of physicians to change or add medication to maintain within normal Blood pressure. In relation to the mean blood pressure among analyzed patient files we found that almost 39 patients (49%) of hypertensive patients followed in OHC had mean blood pressure range between 100/80 to 140/80 mmHg while only 42 patients (33%) at NCOHC were in this range. And only 12 patients (15%) at OHC in comparison to 29 patients (22.5%) at NCOHC were within the range between 100/70 to 140/75 mmHg (Table 1).

Table 2 shows that among hypertensive patients at OHC, 51 patients (65%) were females while the remaining 28 patients (35%) were males; among the females, twenty-five patients (49%), their mean blood pressure were in the range between 100/80 to 140/80 mmHg and thirteen patients (25.5%) were in the range between 100/90 to 140/95 mmHg. While in males, 14 patients (50%), their mean blood pressure were in the range between 100/80 to 140/80 mmHg and only 7 patients (25%) their mean blood pressure were in the range between 100/90 to 140/95 mmHg. In addition, table 2 shows that 46% of hypertensive patients were females at NCOHC the remaining 54% were males. Among the female patients, 37.2%, their mean blood pressure were in the range between 100/80 to 140/80 mmHg, and 23.7%, their mean blood pressure were in the range between 100/90 to 140/95 mmHg. While in males 28.6%, their mean blood pressure were in the range between 100/80 to 140/80 mmHg and 21.4%, their mean blood pressure were in the range between 150/80 to 190/85 mmHg.

According to the data of patients, the majority of them were between 51 - 75 years old, in further details; 48 patients (61%) and 61 patients (47%) were between 51-75 years old at OHC & NCOHC, respectively, The second common group of patients was between 25-50 years old, in which 17 patients (21%) and 54 patients (42%) were between 25-50 years old at OHC & NCOHC, respectively (table 3). By looking to table 4 which shows the use of single and compound drugs in relation to the different levels of blood pressure among patients at OHC & NCOHC, it is clear that, among patients at OHC, 58 patients (73.4%) were using single drug to control blood pressure in comparison to 93 patients (72%) at NCOHC, while 21 patients (26.6%) of OHC using compound drugs in comparison to 36 patients (28%) among NCOHC patients.

Table-1: Blood pressure ranges compared with the number of patients in both clinics

BP Code (Mean BP Range)	OHC	NCOHC	Total (%)
1 [≤ 100/60]	0	2	2 (0.96)
2 [110/60-120/65]	1	4	5 (2.40)
3 [100/70-140/75]	12	29	41 (19.71)
4 [100/80-140/80]	39	42	81 (38.94)
5 [150/80-190/85]	3	20	23 (11.08)
6 [100/90-140/95]	20	27	47 (22.60)
7 [150/95-190/100]	4	4	8 (3.85)
8 [≥ 200/100]	0	1	1 (0.48)

P value = 0.0013

Table-2: Hypertension control mean differences according to gender in the two clinics

BP Code (Mean BP Range)	OHC		NCOHC		Total
	Male	Female	Male	Female	
1 [≤ 100/60]	0	0	2	0	2
2 [110/60-120/65]	0	1	1	3	5
3 [100/70-140/75]	5	7	14	15	41
4 [100/80-140/80]	14	25	20	22	81
5 [150/80-190/85]	0	3	15	5	23
6 [100/90-140/95]	7	13	13	14	47
7 [150/95-190/100]	2	2	4	0	8
8 [≥ 200/100]	0	0	1	0	1
Total	28	51	70	59	208

Table-3: Hypertension control mean differences according to age in the two clinics

BP Code (Mean BP Range)	OHC				NCOHC				Total
	Age Range (Years)		Age Range (Years)		Age Range (Years)		Age Range (Years)		
	25-50	51-75	75-100	25-50	51-75	75-100	25-50	51-75	
1 [≤ 100/60]	0	0	0	0	2	0	0	2	
2 [110/60-120/65]	1	0	0	1	3	0	0	5	
3 [100/70-140/75]	2	6	4	9	15	5	5	41	
4 [100/80-140/80]	6	28	5	26	14	2	2	81	
5 [150/80-190/85]	1	1	1	6	11	3	3	23	
6 [100/90-140/95]	5	11	4	12	13	2	2	47	
7 [150/95-190/100]	2	2	0	0	3	1	1	8	
8 [≥ 200/100]	0	0	0	0	0	1	1	1	
Total	17	48	14	54	61	14	14	208	

Table-4: The use of single and compound drugs in view of the different levels of blood pressure

BP Code (Mean BP Range)	OHC		NCOHC		Total
	1 Drug	> 1 Drug	1 Drug	> 1 Drug	
1 [≤ 100/60]	0	0	2	0	2
2 [110/60-120/65]	1	0	4	0	5
3 [100/70-140/75]	10	2	19	10	41
4 [100/80-140/80]	30	9	37	5	81
5 [150/80-190/85]	3	0	14	6	23
6 [100/90-140/95]	12	8	16	11	47
7 [150/95-190/100]	2	2	1	3	8
8 [≥ 200/100]	0	0	0	1	1
Total	58	21	93	36	208

Drug Prescription; P value: 0.0248. If Drug Prescription has no effect overall, there is a 2.5% chance of randomly observing an effect this big (or bigger) in an experiment of this size. The effect is considered significant. **Blood pressure; P value: 0.0004.** If Blood pressure has no effect overall, there is a 0.044% chance of randomly observing an effect this big (or bigger) in an experiment of this size. The effect is considered extremely significant.

Furthermore, table 5 shows the usage of a single and compound antihypertensive drugs, in which showed that at OHC, Atenolol was used for a wide range of BP between 110/60 to 140/95 mmHg in 5 patients as a single drug followed by Enalapril used in a range of blood pressure 100/70 to 190/100 mmHg in 4 patients, and Hydrochlorothiazide (HCT), Fosinopril, Amlor, used in a range of BP 100/70 to 190/100 mmHg each used in 3

patients. While a combination of Atenolol with Enalapril were used in 4 patients with BP ranges between 100/70 to 190/100 mmHg, and other combinations of HCT and Atenolol were used for 1 patient with blood pressure ranges between 100/90 to 140/95 mmHg. A combination

of Hydrochlorothiazide, Atenolol and Enalapril given to 1 patient with blood pressure ranges between 100/80 to 140/80 mmHg, other combination of Amiloride, Enalapril & Amlor given to 1 patient with blood pressure ranges between 100/70 to 140/75 mmHg.

Table-5: Single and compound drugs-specific blood pressure levels in the two clinics

BP (Total)			BP Code*										
			1	2	3	4	4	6	7	8			
OHC	Single Drug	0	6	-	-	-	-	-	1	-	-		
		2	3,4,7	-	-	1	1	-	-	1	-		
		5	2,3,4,5,6	-	1	1	1	1	1	-	-		
		6	3,6	-	-	1	-	-	1	-	-		
		7	3,4,6,7	-	-	1	1	-	1	1	-		
		8	4	-	-	-	1	-	-	-	-		
		9	4,6	-	-	-	1	-	1	-	-		
		10	3,4,5	-	-	1	1	1	-	-	-		
		13	3,4,6	-	-	1	1	-	1	-	-		
		2,5	6	-	-	-	-	-	1	-	-		
		3,6	6	-	-	-	-	-	1	-	-		
		3,7	4	-	-	-	1	-	-	-	-		
		5,7	3,4,6,7	-	-	1	1	-	1	1	-		
	Compound Drug	2,10	4	-	-	-	1	-	-	-	-		
		5,10	4,6	-	-	-	1	-	1	-	-		
		5,11	4,6,7	-	-	-	1	-	1	1	-		
		5,13	4	-	-	-	1	-	-	-	-		
		7,13	4	-	-	-	1	-	-	-	-		
		10,13	6	-	-	-	-	-	1	-	-		
		11,13	6	-	-	-	-	-	1	-	-		
		2,5,7	4	-	-	-	1	-	-	-	-		
		4,7,13	3	-	-	1	-	-	-	-	-		
		NCOHC	Single Drug	0	4,5,6	-	-	-	1	1	1	-	-
				1	4	-	-	-	1	-	-	-	-
				2	3	-	-	1	-	-	-	-	-
				5	2,3,4,5,6,7	-	1	1	1	1	1	1	-
6	2,3			-	1	1	-	-	-	-	-		
7	1,2,3,4,5,6			1	1	1	1	1	1	-	-		
8	4,6			-	-	-	1	-	1	-	-		
10	3,4,5,6			-	-	1	1	1	1	-	-		
11	5			-	-	-	-	1	-	-	-		
13	6			-	-	-	-	-	1	-	-		
20	6			-	-	-	-	-	1	-	-		
21	5			-	-	-	-	1	-	-	-		
Compound Drug	2,5			4,6	-	-	-	4	-	1	-	-	
	2,7		7	-	-	-	-	-	-	1	-		
	3,6		3	-	-	1	-	-	-	-	-		
	5,7		3,5	-	-	1	-	1	-	-	-		
	2,10		5	-	-	-	-	1	-	-	-		
	2,19		6	-	-	-	-	-	1	-	-		
	4,10		7	-	-	-	-	-	-	1	-		
	5,10		4,5,6	-	-	-	1	1	1	-	-		
	5,13		3,4,5,8	-	-	1	1	1	-	-	1		
	5,14		4	-	-	-	1	-	-	-	-		
	5,17		6	-	-	-	-	-	1	-	-		
	7,14		3	-	-	1	-	-	-	-	-		
	7,20		3	-	-	1	-	-	-	-	-		
10,13	7		-	-	-	-	-	-	1	-			
10,16	6	-	-	-	-	-	1	-	-				
12,15	5	-	-	-	-	1	-	-	-				
18,19	4	-	-	-	1	-	-	-	-				
2,3,10	3	-	-	1	-	-	-	-	-				
2,5,10	3	-	-	1	-	-	-	-	-				
5,7,13	3	-	-	1	-	-	-	-	-				
5,8,14	6	-	-	-	-	-	1	-	-				
2,10,19	6	-	-	-	-	-	1	-	-				
2,12,16	5	-	-	-	-	1	-	-	-				
4,10,14	6	-	-	-	-	-	1	-	-				

For drug codes, refer to table (6); * BP Code (BP Range): 1: [≤ 100/60]; 2: [110/60-120/65]; 3: [100/70-140/75]; 4: [100/80-140/80]; 5: [150/80-190/85]; 6: [100/90-140/95]; 7: [150/95-190/100]; 8: [≥ 200/100].

Table-6: The trend of doctors in changing antihypertensive drugs and doses

Drug code	Name	OHC				NCOHC			
		Type of change				Type of change			
		Trend to change	No drug	Dose	Drug	Trend to change	No drug	Dose	Drug
1	Indapamide/Natrilax	-	-	-	-	-	-	-	-
2	HCT/Esidrex	-	-	-	-	3	-	2	1
3	Frusemide/Lasix	-	-	-	-	1	-	-	1
4	Amiloride-Modur	-	-	-	-	2	-	1	2
5	Atenolol/Tenormin	4	-	1	3	11	-	3	8
6	Captopril/Capoten	1	-	-	1	-	-	-	-
7	Enalapril/Renitec	2	-	1	1	5	-	2	3
8	Lisinopril/Zestril	-	-	-	-	2	-	-	2
9	Prindopril/Coresyl	-	-	-	-	-	-	-	-
10	Fosinopril/Staril	1	-	1	-	15	-	7	9
11	Losartan/Diovan	1	-	-	1	-	-	-	-
12	Methyldopa-Aldomit	-	-	-	-	-	-	-	-
13	Amlodipine-Amlor	-	-	-	-	2	-	-	2
14	Nifedipine-Adalat	-	-	-	-	2	-	-	2
15	Pravastatin/Lipitor	-	-	-	-	-	-	-	-
16	Cyclopentiazide/Navidrex	-	-	-	-	-	-	-	-
17	Thiazide diuretic	-	-	-	-	-	-	-	-
18	Hydrochlorothiazide	-	-	-	-	-	-	-	-
19	Carredilol	-	-	-	-	-	-	-	-
20	Candersarten/Candesarten	-	-	-	-	-	-	-	-
21	Isradipine	-	-	-	-	-	-	-	-
22	Life style modification	-	1	0	0	-	10	0	0
Total		9	1	3	6	43	10	15	30

Table-7: OHC vs. NCOHC - Females VS Males blood pressure

Dunn's Multiple Comparison Test	Difference in rank sum	P value	Summary
Females-OHC vs. Males-OHC	8	P > 0.05	NS
Females-OHC vs. Females-NCOHC	-3.5	P > 0.05	NS
Females-OHC vs. Males-NCOHC	-6.5	P > 0.05	NS
Males-OHC vs. Females-NCOHC	-11.5	P > 0.05	NS
Males-OHC vs. Males-NCOHC	-14.5	P < 0.05	NS
Females-NCOHC vs. Males-NCOHC	-3	P > 0.05	NS

OHC - Females VS Males blood pressure; p value <0.0001;
 NCOHC - Females VS Males blood pressure; p value: 0.0021;
 OHC vs. NCOHC -Female VS Males blood pressure; p value: 0.0168

Table-8: OHC vs. NCOHC - Age

Bonferroni's Multiple Comparison Test	Mean Diff.	P value
25-50-OHC vs. 51-75-OHC	-3.875	P > 0.05
25-50-OHC vs. 76-100-NCOHC	0.375	P > 0.05
25-50-OHC vs. 25-50-NCOHC	-4.625	P > 0.05
25-50-OHC vs. 51-75-NCOHC	-5.5	P > 0.05
25-50-OHC vs. 76-100-NCOHC	0.375	P > 0.05
51-75-OHC vs. 76-100-NCOHC	4.25	P > 0.05
51-75-OHC vs. 25-50-NCOHC	-0.75	P > 0.05
51-75-OHC vs. 51-75-NCOHC	-1.625	P > 0.05
51-75-OHC vs. 76-100-NCOHC	4.25	P > 0.05
76-100-NCOHC vs. 25-50-NCOHC	-5	P > 0.05
76-100-NCOHC vs. 51-75-NCOHC	-5.875	P > 0.05
76-100-NCOHC vs. 76-100-NCOHC	0	P > 0.05
25-50-NCOHC vs. 51-75-NCOHC	-0.875	P > 0.05
25-50-NCOHC vs. 76-100-NCOHC	5	P > 0.05
51-75-NCOHC vs. 76-100-NCOHC	5.875	P > 0.05

OHC vs. NCOHC - overall Age; P value: 0.0156. If Age range has no effect overall, there is a 1.6% chance of randomly observing an effect this big (or bigger) in an experiment of this size, the effect is considered significant.

OHC vs. NCOHC - blood pressure; P value < 0.0001. If Blood pressure has no effect overall, there is a less than 0.01% chance of randomly observing an effect this big (or bigger) in an experiment of this size. The effect is considered extremely significant.

While at NCOHC, still Atenolol is the most commonly used as a single antihypertensive drug in 6 patients with blood pressure ranges between 110/60 to 190/100 mmHg in addition to Enalapril which is given also as a single drug to 6 patients with blood pressure ranges between ≤ 100/60

to 140/95 mmHg, followed by Fosinopril in 4 patients with blood pressure ranges between 100/70 to 140/95 mmHg. As a combination of drugs, most commonly given is a combination of Atenolol with HCT, given to a five patients with blood pressure ranges between 100/80 to 140/95 mmHg followed by a combination of Atenolol with Amlor given to four patients with blood pressure ranges between 100/70 to ≥ 200/100 mmHg, then a combination of Atenolol with Fosinopril, given to three patients with blood pressure ranges between 100/80 to 140/95 mmHg, in addition to the above, a triple drug therapy of different drug groups are given to a seven patients with blood pressure ranges between 100/70 to 140/95 mmHg as shown in (table 5).

Table 6 shows the trend of treating physicians to change either the drugs or doses as an attempt to maintain blood pressure within a normal range. We observed that at OHC, Atenolol was the most common drug that underwent change by physician in four patients, one patient by increasing the dose and in three patients by changing it to another drug while enalapril had been changed twice. Also at NCOHC Fosinopril was the most common drug that underwent change by physician in 15 patients, followed by Atenolol in 11 patients and Enalapril in 5 patients.

As shown in table 7, there was statistically significant difference between male and female patients regarding blood pressure control in two settings. Overall, there was significant difference in blood pressure control among different age groups in two settings as observed in table 8 as well as between single and multiple drugs (table 4).

Discussion

The treatment of the hypertensive patient has as its primary goal to reduce hypertension-induced morbidity and mortality. Current strategies include individual risk assessment, taking into account not only blood pressure values, but also other cardiovascular risk factors and the presence of organ damage.^[10,11] Type and intensity of treatment approach vary according to the level of risk. The higher the risk, the higher the recommended level of treatment.^[12]

Review of a numerous reports from Saudi Arabia literature on hypertension control from 2000 to the present, revealed that control of hypertension falls short of recommended goals, there is a need to adopt a strategy that incorporates health education about life style and proper protocol as this has been found useful in some studies.^[13] The Saudi hypertension management group (SHMS) was established in 2004 to develop the practical guidelines for the management of hypertension in Saudi Arabia with special attention given to our local circumstances and cultural background.

This study shows that most of our patients in the 2 clinics were from age 51-75 years old, which is 61% & 47% in OHC & NCOHC respectively, were their blood pressure ranging from 100/80 to 140/80 mmHg and the younger age group 25-50 years old 21 % & 42% at OHC & NCOHC respectively were having almost the same blood pressure, so Age range has the same effect (if any) at all levels of Blood pressure. If Age range has no effect overall, there is about 1.6% chance of randomly observing an effect this big (or bigger) in an experiment of this size, the effect is considered significant.

It was also known from this study that most of the hypertensive patients at OHC clinic were females (65%), but with both sex; blood pressure mainly was between 100/80 to 140/80 mmHg; i.e. 49% of the OHC patients' blood pressure lies in this blood pressure range, which considered to be near to the target blood pressure goal <140/90 mmHg according to the JNC VII which is associated with a decrease in cardiovascular disease complication. As at NCOHC, the opposite, most of the hypertensive patients (54%) were males, while the main blood pressure in both sex (28.6%) was < 140/80 mmHg, and 21.4% of the male patients, the blood pressure range between 150/80 to 190/85 mmHg.

There seems to be inconsistent relationship between males and females blood pressure control especially in areas

outside the cities, were males have less controlled blood pressure, probably due to many stressors or self-neglect or in compliance to treatment due to less education levels.

The mainstay way of controlling blood pressure is by drugs, one patient only at OHC his blood pressure was controlled by life style modification alone, while the others were mainly by single drug [73.4% & 72%, respectively] at OHC & NCOHC, while the remaining used multiple drugs. The most common used single drug at (OHC) is Atenolol, followed by Enalapril then Hydrochlorothiazide (HCT), Fosinopril, Amlor in equal frequency. The most common combination of drugs is Atenolol & Enalapril, then Atenolol & Hct. A combination of Atenolol & Hct & Enalapril was given to one patient, and Amiloride & Enalapril & Amlor was given also to one patient. While at NCOHC, Atenolol and Enalapril are the most common used single drugs, and a combination of Atenolol with Hct followed by Atenolol with Amlor followed by Atenolol with Fosinopril. Triple therapy was given also as shown in table 5.

According to JNC VII guidelines, Thiazide type diuretics have been the basis of antihypertensive therapy in most outcome trials, in these trials; including the recently published antihypertensive & lipid lowering treatment to prevent heart attack trial (ALLHAT), diuretics have been virtually unsurpassed in preventing the cardiovascular complication of hypertension. Diuretics enhance the hypertensive efficacy of multidrug regimens; can be useful in achieving blood pressure control, despite these finding diuretics remains underutilized. The exception of that is the second Australian national blood pressure trial which reports slightly better outcomes in white men with a regimen that begin with an Angiotensin Converting Enzyme (ACE) Inhibitor compared to one starting with a diuretics.

Conclusion

In conclusion, this study is the only one done including wide varieties of patients, from different sex, age, socio-economic and racial variations, among patients having hypertension. As the results of this study showed that control of blood pressure among hypertensive patients on drug treatment is still far from the target aimed in most of the guidelines.^[12,13] As hypertension is a disease of multifactorial etiology, non-pharmacological means of reducing factors resulting in hypertension and uncontrolled blood pressure are as important as pharmacological means increasing awareness among general population about the importance or regular exercise ,eating more vegetables and fruits and avoiding

fat and stopping smoking is very important and cost effective. In the light of our results, health education system might be needed for ways to control blood pressure by different means, starting from life style modification to combining appropriate medications.

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