The Compliance with Anti-Hypertensive Drugs Among Hypertensive Patients Attending A'ali Health Center

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I.   Background information

Hypertension is a chronic medical condition, which require high compliance and modification in lifestyle. As it is widely believed that hypertension prevalence has increased worldwide and especially among our geographic area which is in this case Bahrain. WHO reported: "Globally, nearly one billion people have high blood pressure (hypertension); of these, two-thirds are in developing countries"[1]. In addition, WHO also published in April 2011 that hypertension in Bahrain reached 11% of total death percentage, which make it the third cause of death. The prevalence of hypertension in Bahrain is 16.3%[2].From a medical point view, blood pressure is determined by the amount of blood the heart pumps and amount of blood flow in the arteries. Blood pressure is written as two numbers. The first (systolic) number represents the pressure in blood vessels when the heart beats. The second (diastolic) number represents the pressure in the vessels when the heart rests between beats[3]. As a result of this hypertension also associated with other systemic diseases such as heart failure, metabolic syndrome and other disease that are understandable until know. Stated to Wilson PW, In the article - Established risk factors and coronary artery disease - : " hypertension is most important modifiable risk factor for coronary heart disease (the leading cause of death in North America). It causes stroke (the third leading cause), congestive heart failure, end-stage renal disease and peripheral vascular in young and older population. Hypertension is quantitatively the major risk factor for premature cardiovascular diseases being more common by cigarette smoking, dyslipidemia and diabetes". [1,2, 4]

According to World Health Organization website (www.who.int), Hypertension is called the silent killer because it often has no warning signs or symptoms, and many people do not realize they have it; that is why it's important to get blood pressure checked regularly. So in order to prevent this fatal death a good compline is required. [1,3,4]

Compliance could be defined as the degree of constancy and accuracy with which a patient fallow a prescribed regimen, as distinguished from adherence or maintenance. On the other hand, non-compliance has been defined as the predominant reason for the failure of medical thereby and diseases progression. Moreover, misunderstanding about the medication regimen, adverse side effect and patient physician relation ship could be possible causes of noncompliance with anti-hypertensive drugs. From this we inspired our research topic (the compliance with anti-hypertensive drugs among hypertensive patient attending A'ali health center. As a group we chose the A'ali health center for our study because it is a government hospital and the majority of the attendees are native citizens. A'ali area is highly prevalent of all non communicable disease risk factor including hypertension. [1,2,3,4]

Blood Pressure Levels	
Normal	Systolic: less than 120 mmHg Diastolic: less than 80 mmHg
At risk (prehypertension)	Systolic: 120–139 mmHg Diastolic: 80–89 mmHg
High	Systolic: 140 mmHg or higher Diastolic: 90 mmHg or higher

Demographic background:
- Geographic sitting: in a research done for a compliance of anti-hypertensive drugs made in A'Ali Health Centre in Bahrain between 2nd to 6th December 2012.
- Community size: a sample of 120 patients randomly selected to be interviewed. The total number of population in the Central governorate, which A'Ali Health Center is located within, is 326,305 as per the 2010 census. The total recorded visits to A'Ali Health Center in 2010 was 86,759.

- Related health services: public health center services provided at the family physician level.

Information related to the study:

II.   Literature review

Definition of hypertension (WHO):

Blood Hypertension is the force of blood against the artery wall as it circulates through the body OR constant pumping of blood through blood vessels with excessive force when reach systolic: 140 mmHg or higher and diastolic: 90 mmHg   or higher

Prevalence of hypertension:

The prevalence of hypertension is about 1 billion people who have hypertension tow third are found in developing countries in 2025 an estimated 1.56 billion adults will be living with hypertension , hypertension kills 8 million every year and 1.5 in South-East Asia (SEA). [5]

Diet, life style and obesity can affect hypertension

Complications:

Hypertension can cause serious damage to health. It can harden the arteries decreasing the flow of blood and oxygen to the heart o this reduction can cause : [6]

1- Angina
2- Heart failure
3- Heart attack

In a research done in Seychelles (2) , in 1994 , a random age and sex sample (25-64 yrs) were taken , (1067 out of 1226) over 23 months using antihypertension medication satisfactory compliance 86% corresponds to taking the medication and those with poor compliance from 26% - 32% and compliance was better among who regularly attended medical follow up with 74% and compliance data were unavailable for 3.5% of patients. [7]

And another research was done in Murtala Mohammed specialist hospital, Kani, Nigeria in 2004 on a sample of 360 (female;180 , male;180) the level of compliance with drugs among hypertensive patients the result were poor compliance in 45.8% and good in 54.2% of the them. [8] Other research done in Abbottabad, Pakistan in 2007 sample of outpatient clinic of medicine Shahin Jamal hospital among 89 patients' (67 female and 22 male) with mean age of 55-13mean systolic and diastolic BP of 160 and 14 respectively and pulse rate of 58.9per minute 25.8% were having controlled hypertension, 48.3 %were complaint and 51.7% were not complaint of hypertension drugs, 55.1% were having salt restriction and 44.9% were having no salt restriction and 23.6 % were used to do physical activity while 76.4% were not used to do physical activity. [9]

Rationale (purpose to carry out the study): As far as we know this is the first study assessing the compliance with anti hypertensive medications in the GCC. This study would contribute in enhancing the community oriented research efforts in Bahrain.

Study objectives:

1- To define the profile of the hypertensive patients (age, gender, etc.)
2- To define the causes of compliance or non-compliance among patients
3- To assess the level and evaluate the reasons of compliance or non-compliance
4- To explore the significant factors associated with hypertension.

Moral and medical ethics:

Prior to conducting the survey, a written consent was obtained from the Ministry of Health in Bahrain. Also, a verbal consent was obtained from each and all participating patients during the survey.

All responses were kept private and confidential, as well as, anonymous.

III.   Methodology

Study design:

Cross sectional observational study to assess the compliance with anti-hypertensive drugs among hypertensive patients attending A'ali health center in the period of 4th to 11th of November 2012.

Study population & sampling method:

All adult patients attending medical clinics in A'ali health center for hypertension in the study period will be included.

Date collection:

Data collection will be through a questionnaire was designed for the purpose of this study. It included questions on socio demographic details, drugs, complications of high blood pressure and compliance. The questionnaire consisted of 20 questions items both categorical and non-categorical. (Appendix 1)

Blood pressure was measured by the researchers using the sphygmomanometer as per the implemented guidelines.

Exclusion and inclusion criteria:

All adult patients attending medical clinics in A'ali health center for hypertension in the study period will be included.

Sample size:

It was calculated based on the formulas to be 120 patients. The sample was selected randomly. The sampling method employed was: simple random sampling.

Data analysis:

All variables will be assessed through various statistical measurements including means and standard deviations. Statistical significance will be tested among different chosen variables including sex, age versus knowledge and attitude. SPSS will be used to analyze the data.

Compliant patients' classification

The compliant patients were classified as per Question 12 of the questionnaire which included eight statements as follows.

Question12	If Patient Response is
1. Do you take your medicine as prescribed?	Daily
2. Do you forget to take your medicine?	Never
3. Are you careless about taking your medicine?	Never
4. Do you stop taking your medicine because you feel better?	Never
5. Do you stop taking your medicine because it makes you feel worse?	Never
6. Do you stop taking the medication because you believe that they are ineffective?	Never
7. Do you stop taking your medicine because you fear negative side-effects?	Never
8. Do you obtain a medication refill in before you run out of medicine?	Daily

If the patients response on the above statements were otherwise, then the patient was considered "non-compliant".

Overall hypertension control

The overall hypertension control was classified as per WHO definition if both systolic and diastolic blood pressure were high, i.e. systolic blood pressure $\geq$ 140 mmHg and diastolic blood pressure $\geq$90 mmHg.

Statistical techniques

The statistical techniques performed included the following:
1. Frequency tables
2. Cross-tabulation
3. Mean
4. Standard deviation
5. Significance tests:
a. t test: this test was used to verify if the mean difference among two groups was significant.
b. Chi square: this test was used to find a significant relationship between two qualitative variables.
c. Pearson Correlation: this test was used to determine any significant linear association (correlation) between two quantitative variables. The test allows to determine the strength of the correlation and its direction.
 i. The closer Pearson correlation coefficient (r) to absolute value of 1, the stronger the correlation. And the closer the coefficient from zero (0), the weaker the correlation is.
 ii. If the coefficient was positive (+), then the correlation is upward or positive, i.e. as one variable increases, the other variable increases and vice versa.
iii. If the coefficient was negative (-), then the correlation is downward or negative, i.e. as one variable increases, the other variable decrease and vice versa.

Statistical significance

For statistical hypotheses testing, the significance level was evaluated as follows:
• Any p-value less than 0.05, was considered as significant at 5%.
• Any p-value less than 0.01, was considered as strongly significant at 1% level,
• Any p-value greater than or equal 0.05, was considered not significant (n.s.)

IV. Results

This research was conducted for a compliance of anti-hypertensive drugs made in A'Ali Health Centre in Bahrain between 2nd to 6th December 2012. All the patients attending the clinics for hypertension were interviewed. The number of patient interviewed was 120.

In this section, the results of the sample responses are shown.

The results were classified with the view to provide answers to the three research objectives, as follows:
- Sample description
- Patient profile of hypertension
- Non-compliance level
- Causes of non-compliance among hypertensive patients
- Assessment of the level of non-compliance among hypertensive patients
- Evaluation of the reasons of non-compliance of hypertensive patients
- Factors associated with hypertensive patients

The following section presents the description of the patients which agreed to participate in this study.

1.1 Sample description
The below table and charts show the sociodemographic variables of the sample studied.

Table 1 Sample description by sociodemographic variables

		No.	%
Gender	Male	55	45.8%
	Female	65	54.2%
	Total	120	100.0%
Age group	< 40 years	4	3.3%
	40 -< 65 years	70	58.3%
	65 years or more	46	38.3%
	Total	120	100.0%
Education	Below secondary	34	36.2%
	Secondary	33	35.1%
	Bachelor	25	26.6%
	Master	2	2.1%
	Total	94	100.0%
Occupation	Retired	20	25.0%
	Driver	1	1.3%
	Taxi driver	7	8.8%
	Shop worker	7	8.8%
	Factory worker	1	1.3%
	Teacher	16	20.0%
	Employee in Ministry of Works	2	2.5%
	Employee in Electricity and Water Authority	4	5.0%
	Ministry of Education	1	1.3%
	Employees in Ministry of Health	1	1.3%
	Nursing	2	2.5%
	Accounting in bank	1	1.3%
	Banker	8	10.0%
	Businessman	7	8.8%
	Private sector	2	2.5%
	Total	80	100.0%

	Mean	Median	Std. Deviation
Age (years)	59.33	60.00	11.555

Distribution of sample by Gender
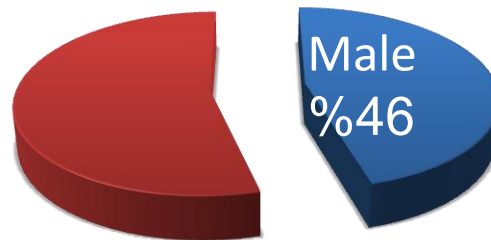
Male
%46

Figure 1

Distribution of sample by Age

40 >
years
%3

years 65
or more
%38

65 >- 40
years
%59
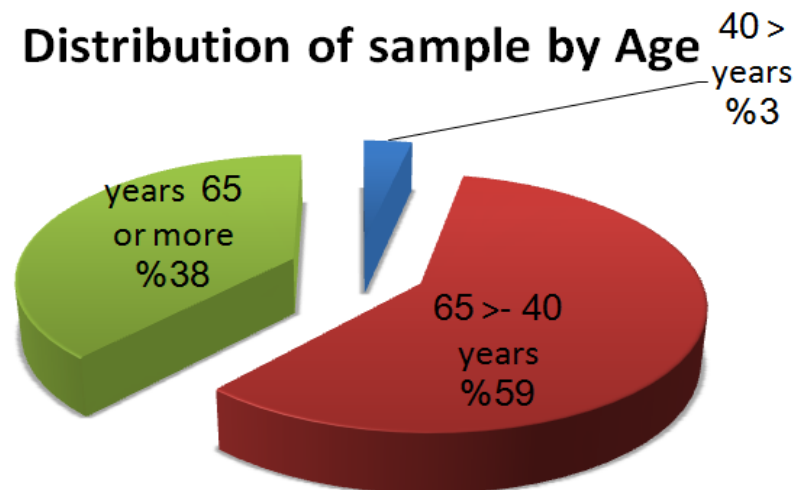
Figure 2

Distributin of sample by Education

%100

%80

%60

%40

%20

%0

% os sample

%36.2

%35.1

%26.6

%2.1

Below
secondary

Secondary

Bachelor
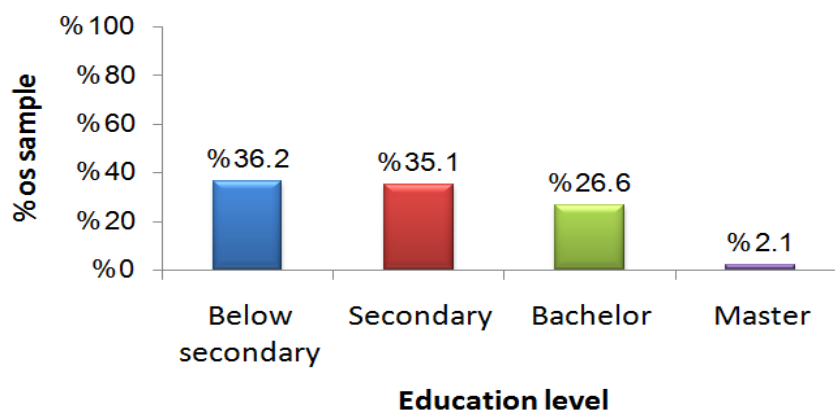
Master
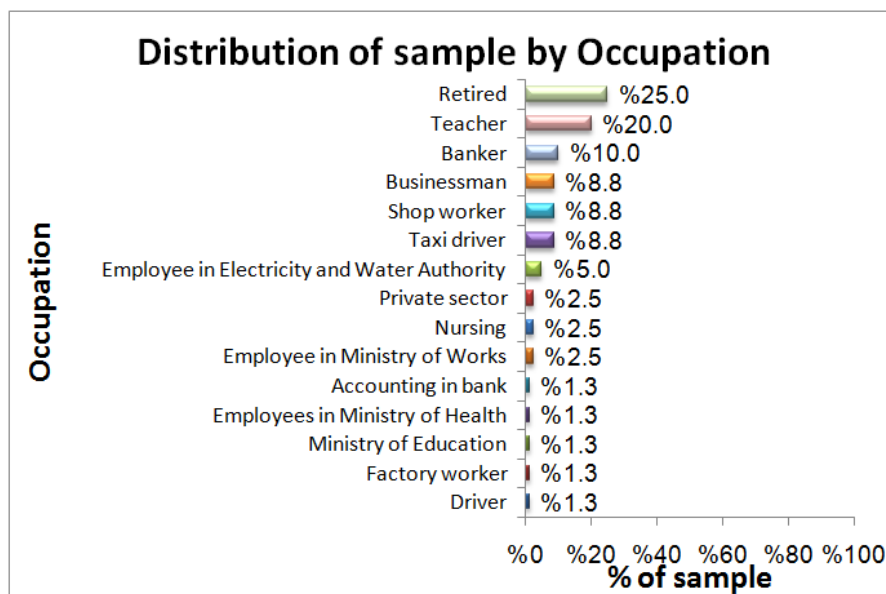
Education level

Figure 3

Figure 4

Table 1 and figures 1 to 4 show that:

- The patients which agreed to participate in this study are split into two half almost. Female represented 54% in compare to male (46%).
- The great majority (97%) of the sample belong to the age range from 40 years to 65 years or more, in compare to only 3% with ages less than 40 years.
- Majority (71% approximately) of the sample has limited education at Below secondary or Secondary degree, while the remaining portion was distributed among Bachelor degree holders (27% approximately) and only 2% approximately with Master degree.
- The occupation of the sample varied as follows: Retired workers (25%), Teachers (20%), Bankers (10%), and the remaining with less than 10% included the following: Businessmen, Shop workers and Taxi drivers (each 9% approximately), Employees of Electricity and Water Authority (5%), Private sector workers, Nursing and Employees of Ministry of Works (3% approximately) and Employees of Ministry of Health, Employees of Ministry of Education, Factory workers and Drivers (1% approximately).

The next section continues the result to show the hypertension profile of the sampled patients.

1.2 Patient profile of hypertension
This section presents the hypertension status of the sampled patients.
Systolic Hypertension
Table 2 below show the levels of hypertension among the sampled patients, as per systolic WHO definitions.

Table 2 Systolic Blood Pressure Levels among the sampled patients

		Frequency	Percent
Valid	Mild (120 - 139 mmHg)	65	54.2
	High - hypertension (140 mmHg or higher)	55	45.8
	Total	**120**	**100.0**

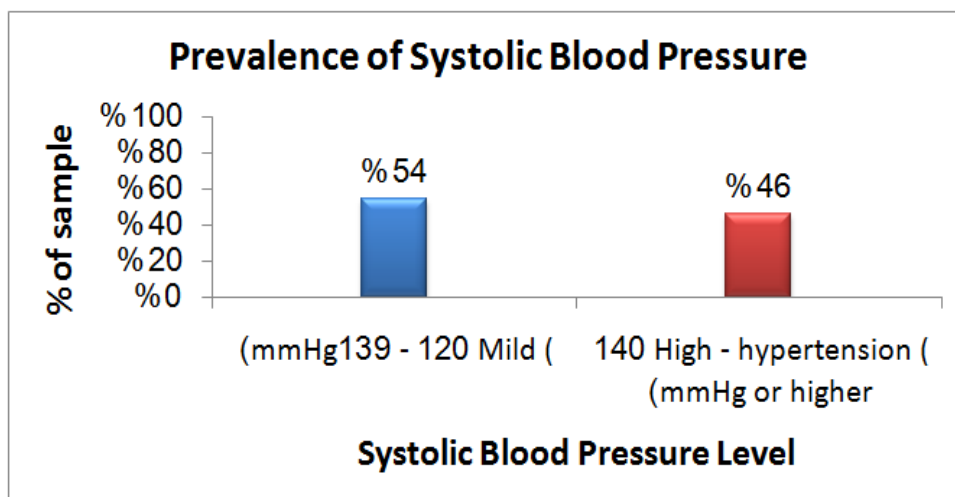Figure 5 below show the table 2 results pictorially.

Figure 5

Table 2 and figure 5 show that:
- The sampled studied patients are classified into two of the three systolic blood pressures levels as defined by the WHO.
- Slightly more than half (54% approximately) of the patients sampled had at risk – prehypertension with blood pressure between 120 to 139 mmHg. This reflects the compliance level.
- The prevalence of hypertension with blood pressure of 140 mmHg as defined by WHO was 46% approximately. This represents the non-compliance level among the studied patients.
- The mean of systolic blood pressure was 138.3 with a standard deviation of 14.7.
- Pearson correlation showed that there is a significant moderate positive correlation between systolic blood pressure and age (Pearson correlation coefficient r = 0.4; p-value=0.000).

Diastolic Hypertension
Table 3 shows the levels of hypertension among the sampled patients, as per diastolic WHO definitions. Figure 6 next shows this result graphically.

Table 3 Diastolic Blood Pressure among the sampled patients

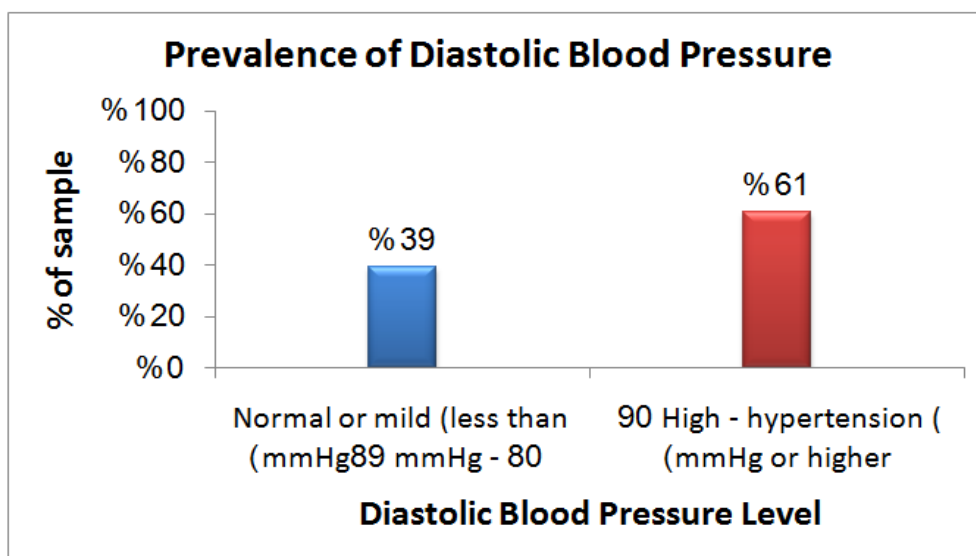|		Frequency	Percent
Valid	Normal or mild (less than 80 mmHg – 89 mmHg)	47	39.1
	High - hypertension (90 mmHg or higher)	73	60.8
	Total	**120**	**100.0**

Figure 6

Table 3 and figure 6 show that:

- Normal and prehypertension prevalence among the sampled patients was 39% approximately.
- The majority of the sampled patients (61% approximately) suffer uncontrolled hypertension with blood pressure of 90 mmHg or higher.
- The mean diastolic blood pressure was 93.4 with a standard deviation of 16.2.
- Pearson correlation showed that there is a significant moderate positive correlation between diastolic blood pressure and age (Pearson correlation coefficient r = 0.4; p-value=0.000).

Overall Hypertension Control

Uncontrolled patients were determined if at the same time, systolic was 140 mmHg or higher and diastolic is 90 mmHg or higher. Accordingly, table 5 below show the overall hypertension level among the sampled patients.

Table 4 Overall hypertension controlamong the sampled patients

		Frequency	Percent
Valid	Normal or mild	74	61.7
	Hypertensive	46	38.3
	Total	**120**	**100.0**

The hypertension control prevalence is graphed in figure 7 below.
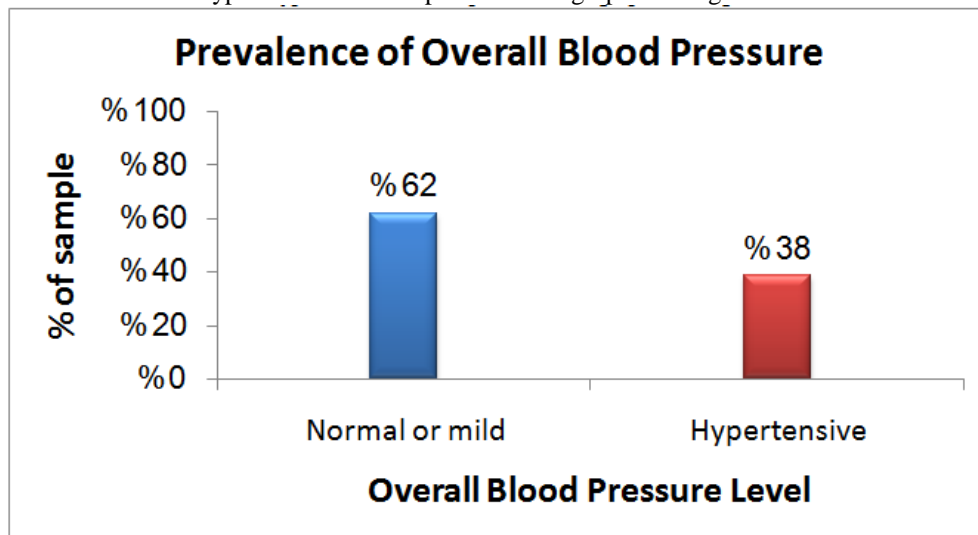
Figure 7

For further analysis, the hypertension levels were grouped by the following variables:

- Gender
- Age
- Education, and
- Occupations
- Have any relatives diagnosed as high blood pressure patient? (yes%)
- Have you been prescribed drugs to reduce high blood pressure? (yes%)
- Do you know the names of the drugs? (yes%)
- Do you take these drugs now? (yes%)
- Do you know the best time to take your medicine? (yes%)
- Do you Smoke? (yes%)
- Do you do physical exercise? (yes%)
- Do you know the complications of High Blood Pressure? (yes%)

Hypertension by sociodemographic and other variables

Table 5 presents the summary results of hypertension status comparison with the sociodemographic and other variables studied. The table also shows the result of the significant tests chi square and t test. These two statistical tests determines if the comparison was significant or not.

Table 5 Comparison between overall hypertension status and the sociodemographic and other variables

	Number of subjects (n=120)		Statistic	p-value
	Normal or mild (n=74)	Hypertensive (n=46)		
Sociodemographic variables				
Gender (Female %)	44 (59%)	21 (46%)	χ^2= 2.178	.140
Age (years)	57.07±10.27	62.96±12.66	t= -2.791	.006**
Age (≥ 40 years%)	72 (97%)	44 (96%)	χ^2= 8.929	.012*
Education (bachelor or higher%)	17 (23%)	10 (22%)	χ^2= 3.896	.273
Occupation (Retired%)	11 (15%)	9 (20%)	χ^2= 15.337	.356
Other variables				
Have any relatives diagnosed as high blood pressure patient? (yes%)	65 (87.8%)	45 (97.8%)	χ^2= 3.705	.054
Have you been prescribed drugs to reduce high blood pressure? (yes%)	74 (100%)	46 (100%)	-	-
Do you know the names of the drugs? (yes%)	60 (81.1%)	29 (63.0%)	χ^2= 4.817	.028*
Do you take these drugs now? (yes%)	74 (100%	100%	-	-
Do you know the best time to take your medicine? (yes%)	64 (86.5%)	43 (93.5%)	χ^2= 1.436	.231
Do you Smoke? (yes%)	20 (27.0%)	20 (43.5%)	χ^2= 3.455	.063
Do you do physical exercise? (yes%)	37 (50.0%)	14 (30.4%)	χ^2= 4.443	.035*
Do you know the complications of High Blood Pressure? (yes%)	59 (80.8%)	45 (97.8%)	χ^2= 8.039	.005**

Data presented as mean ± standard deviation or number (n) (%). Missing values in Education is: 14 in Normal or mild, and 12 in Hypertensive. The tests used where: Chi square (χ^2 statistic) and t test (t statistic).
* p-value < 0.05 significant at 5%; ** p-value< 0.01 significant at 1%

When comparing the normal or mild patients with uncontrolled ones (see table 5), it was found that:
- There is a statistical difference in the mean between hypertensive patients and normal or mild patients, with the hypertensive group being significantly older (62.96 versus 57.07; p-value<0.01). The same result was found using Chi square (χ^2= 8.929; p-value<0.05).
- Patients who know the name of drugs were statistically more controlled than those who did not. The prevalence of uncontrolled hypertension of patients who know the names of the drugs was significantly less than that of those normal or mild patients who know the name of drugs (63% versus 81.1%; χ^2= 4.817; p-value<0.05).
- Patients who do physical exercises were statistically more controlled than those who did not. The prevalence of uncontrolled hypertension among patients who do physical exercises was significantly less than that of normal or mild patients who do physical exercises (30.4% versus 50%; χ^2= 4.443; p-value<0.05).
- Patients who know the complications of high blood pressure were statistically uncontrolled than those who did not know. The prevalence of uncontrolled hypertension among patients who know the complications of high blood pressure was significantly higher than that of normal or mild patients who know the complications (97.8% versus 80.8%; χ^2= 8.039; p-value<0.01).

1.3 Compliance vs. Non-compliance level
The compliance level was determined as per the self-reported eight responses on Question 12. The patient was classified as compliant if the responses were indicating that he/she is:
- taking the drugs on **daily** basis,
- refilling the medicine on **daily** basis,
- **never** forgets to take the medicine,
- **never** be careless about taking the medicine,
- **never** stops taking the medicine because feeling better,
- **never** stops taking the medicine because it makes him/her feel worse,
- **never** stops taking the medication because him/her believe that they are ineffective,
- **never** stops taking the medicine because of fearing negative side-effects.

The prevalence of compliance is shown in table 6 below.

Table 6: Compliance status among the sampled patients

		Frequency	Percent
Valid	Non-compliant	59	49.2
	Compliant	61	50.8
	Total	**120**	**100.0**
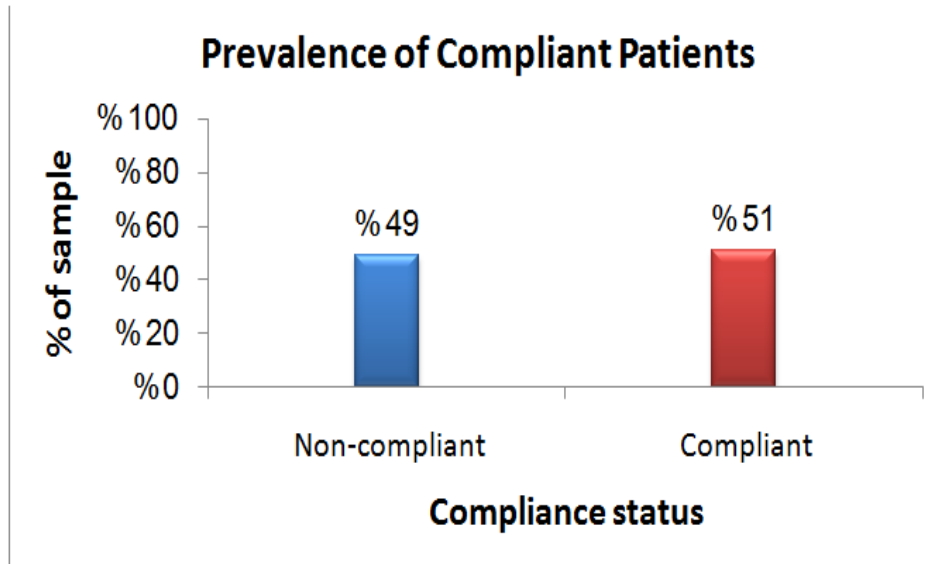
Figure 8

Table 6 and figure 8 show that the prevalence of compliant patients was 51% (61 patients), while the prevalence of non-compliant patients was 49% (59 patients).

Compliance by sociodemographic and other variables

Table 7 presents the summary results of compliance status comparison with blood pressure, the sociodemographic and other variables studied. In addition, the table shows the results of the statistical tests chi square test and t test. These two statistical tests determine if the comparison was significant or not.

Table 7 Comparison between compliance status and the sociodemographic and other variables

	Number of subjects (n=120)		Statistic	p-value
	Non compliant (n=59)	Compliant (n=61)		
Blood pressure				
Hypertensive%	29 (49.2%)	17 (27.9%)	χ^2= 5.747	.017*
Systolic blood pressure (mmHg)	140.24±14.60	136.43±14.69	t=1.425	.157
Diastolic blood pressure (mmHg)	100.27±17.21	86.82±12.02	t=4.948	.000**
Sociodemographic variables				
Gender (Female %)	31 (52.5%)	34 (55.7%)	χ^2= .123	.725
Age (years)	59.14±10.99	59.51±12.17	t= -2.791	.006**
Age (≥ 40 years%)	59 (100%)	57 (93%)	χ^2= 5.665	.059
Education (bachelor or higher%)	12 (20%)	15 (25%)	χ^2= 3.712	.294
Occupation (Retired%)	10 (25.6%)	10 (24.4%)	χ^2= 13.959	.453
Other variables				
Have any relatives diagnosed as high blood pressure patient? (yes%)	56 (94.9%)	54 (88.5%)	χ^2= 1.603	.205
Have you been prescribed drugs to reduce high blood pressure? (yes%)	59 (100%)	61 (100%)	-	-
Do you know the names of the drugs? (yes%)	37 (62.7%)	52 (85.2%)	χ^2= 7.949	.005**
Do you take these drugs now? (yes%)	59 (100%)	61 (100%)	-	-

Do you know the best time to take your medicine? (yes%)	51 (86.4%)	56 (91.8%)	$\chi^2 = .893$	.345
Do you Smoke? (yes%)	23 (39.0%)	17 (27.9%)	$\chi^2 = 1.667$	.197
Do you do physical exercise? (yes%)	19 (32.2%)	32 (52.5%)	$\chi^2 = 5.035$	.025*
Do you know the complications of High Blood Pressure? (yes%)	49 (83.1%)	55 (91.7%)	$\chi^2 = 1.313$	.252

Data presented as mean ± standard deviation or number (n) (%). Missing values in Education is: 14 in Normal or mild, and 12 in Hypertensive. The tests used where: Chi square (χ^2 statistic) and t test (t statistic).
* p-value < 0.05 significant at 5%; ** p-value< 0.01 significant at 1%

When comparing the compliant patients with non-compliant ones (see table 7), it was found that:
- Hypertensive patients were statistically less compliant than those who are not. The prevalence of compliant among hypertensive patients was significantly less than that of those non-compliant (27.9% versus 49.2%; $\chi^2 = 5.747$; p-value<0.017). See appendix for the full result of this chi square result.
- Diastolic blood pressure mean was significantly lower in compliant patients compared with non-compliant (86.82 versus 100.27; p-value<0.01).
- The mean of age between compliant patients and non-complaints was significantly different, with the compliant group being significantly older (59.51 versus 59.14; p-value<0.01).
- Patients who know the name of drugs were statistically high compliance than those who did not. The prevalence of compliant patients who know the names of the drugs was significantly higher than that of those non-compliant patients who know the name of drugs (85.2% versus 62.7%; $\chi^2 = 7.949$; p-value<0.01).
- Patients who do physical exercises were statistically high compliant than those who did not. The prevalence of compliant patients who do physical exercises was significantly higher than that of non-compliant patients who do physical exercises (52.5% versus 32.2%; $\chi^2 = 5.035$; p-value<0.05).

The next section presents the non-compliance causes among hypertensive patients.

V. Discussion

The patients which agreed to participate in this study are split to two half almost. This reflects the populations of the patients as women are the majority of the health centers' patients.The great majority (97%) of the sample belong to the age range from 40 years to 65 years or more. This reflects the population of patients which is centered around old ages, generally.Majority (71% approximately) of the sample has limited education at Below secondary or Secondary degree. This distribution reflects the education pattern of patients visiting the public health centers in Bahrain where the majority are with limited education level. The mean age was 59.3 years, which implies that on average the patients are old.One fifth (25%) of the sampled patients were Retired workers. This implies that the working background is diverse and that the highest represented working status is retired employees.In the study of Fodor et al (2005), the total number of hypertensive respondents was 841 out of 2812 (29.9%). This implies that the prevalence of hypertension in Bahrain (38.3%) is higher.The National Non-communicable Diseases Risk Factors Survey (2007) which the Ministry of Health in Bahrain published in the year 2010 has found that the mean systolic and diastolic blood pressure of the study participants with valid measurements (1760) were 134.6 mmHg and 80.6 mmHg respectively. The means were higher in males (137.2 mmHg and 82.1 mmHg) than females (132.1 mmHg and 79.2 mmHg). In this study, it was revealed that the mean systolic and diastolic were higher (138.3 mmHg and 93.4 mmHg, respectively). On the other hand, the same pattern was found as males (140.65 mmHg and 96.16 mmHg, respectively) had higher blood pressure in compare to females (136.31 mmHg, 91.12 mmHg, respectively).

The survey revealed that the high blood pressure reading was found in 38.2% of all participants and that the rate was higher among males compared to females (42.9% versus 33.7%). In this study, the overall hypertension rate (38.3%) was almost the same and the hypertension was higher among males compared to females (54.3% versus 45.7%). This implies that the prevalence of blood pressure has not changed since 2005. So the efforts of the Ministry of Health were sufficient to maintain the same level, however, it was not successful to reduce it. The report stated that the overall prevalence of hypertension among participants was 42.7% if the history of the disease and the newly detected diseases were combined. If this is considered, then this study shows that the hypertension level has reduced since 2005. Thus, the Ministry of Health has been successful in reducing this disease, however by a very small level (4% only).In the same regard, the Ministry of Health official statistics published online for the year 2010 show that the total of 7,522 cases were registered for hypertension out of 32,586 (23.1% approximately). The statistics showed that the rate of hypertension increases as the patient gets older. This study has revealed a higher hypertension level by 15% with the same positive

correlation between age and hypertension.Fodor et al found that 359 respondents reported that they were prescribed drug treatment for hypertension, of which 192 (53.5%) were classified as 'compliant'. This implies that in Bahrain, there was less compliant level as there were 61 compliant patients out of the total of 120 (50.8%).With regard to the significant statistical test performed on compliance level, Fodor et al found that, of the total number of respondents taking antihypertensive drugs, 52% of males and 39% of females were classified as 'non-compliant' (p=0.01). However, this study has not shown sufficient statistical evidence to conclude that gender differentiate compliance level.Fodor et al study found a significant difference in the mean age between compliant patients and non-compliant patients, with the compliant group being significantly older (48.9 years versus 46.7 years) than the non-compliant group (P=0.005). The same was found in Bahrain as the mean age of non-compliant patients was significantly lower than that of compliant patients (59.1 versus 59.5 years, p-value=0.006).The non-compliant patients had a mean SBP level 6.8 mmHg higher and a mean DBP level 3.1 mmHg higher than the compliant group, with calculated P values of <0.002 and <0.01, respectively. In Bahrain, only a significant difference was found in DBP where non-compliant patients had a mean of 100.27 higher (p-value=0.000). However, SBD mean was not found significantly different at 5% significance level.Patients who smoked were significantly less compliant than those who did not (P=0.005) as Fodor et al found, but this study failed to find a significant difference.

Project summary:

This is a proposal prepared by four medical students from Arabian Gulf University about Hypertension generally and about the compliance with Anti-Hypertensive Drugs among Hypertensive patients attending A'ali health center specifically.

Reference

[1].   Ministry of health , Bahrain cited 13 Oct 2011,Available from
        http://intranet.health.gov.bh/Docs/Reports%20%20Studies/NCD%20Survey%20Report.pdf
[2].   Habib M. Management of Hypertension in Local Health Centers in Bahrain. Bahrain Medical Bulletin, 2003, 25 (2).
[3].   Thrall G ,Lip G, Lane D. Compliance with pharmacological therapy in hypertension: can we do better, and how?. Journal of Human Hypertension 2004 (18) 595–597.
[4].   Health profile in Bahrain [podcast on the internet]. available from: http://www.worldlifeexpectancy.com/sitemap.
[5].   WHO Statistical Information Service (WHOSIS).2011.
[6].   From: http://www.searo.who.int/linkfiles/non_communicable_diseases_hypertension-fs.pdf (accessed September 2011).
[7].   Bovet P, Burnier M, Madeleine G, Waeber B, Paccaud F. Monitoring one-year compliance to antihypertension medication in the Seychelles. Bulletin of the World Health Organization 2002, 80 (1): 33-39
[8].   Kabir M, Iliyasu Z, Abubakar I, Jibril M. Compliance to medication among hypertensive patients in Murtala Mohammed Specialist Hospital, Kano, Nigeria. Journal of Community Medicine & Primary Health Care 2004, 16 (1): 16-20.
[9].   Ahmed N, Khaliq M, Shah S, Anwar W. Compliance to antihypertensive drugs, salt restriction, exercise and control of systemic hypertension in hypertensive patients at Abbottabad. J Ayub Med Coll Abbottabad 2008, 20 (2): 66-69
[10].   JOHN H, MORTON B, DAVIS J, REICHGOTT M. Patient Compliance with Antihypertensive Medication. Am J Public Health 1980; 70:1081-1089.
[11].   Hungerbuhler P, Bovet P, Shamlaye C, Burnand B, Waeber B. Compliance with medication among outpatients with uncontrolled hypertension in the Seychelles. Bulletin of the World Health Organization, 1995, 73 (4): 437-442

Appendix

Do you have any relatives diagnosed as high blood pressure patient?

		Frequency	Percent
Valid	Yes	110	91.7
	No	10	8.3
	Total	**120**	**100.0**
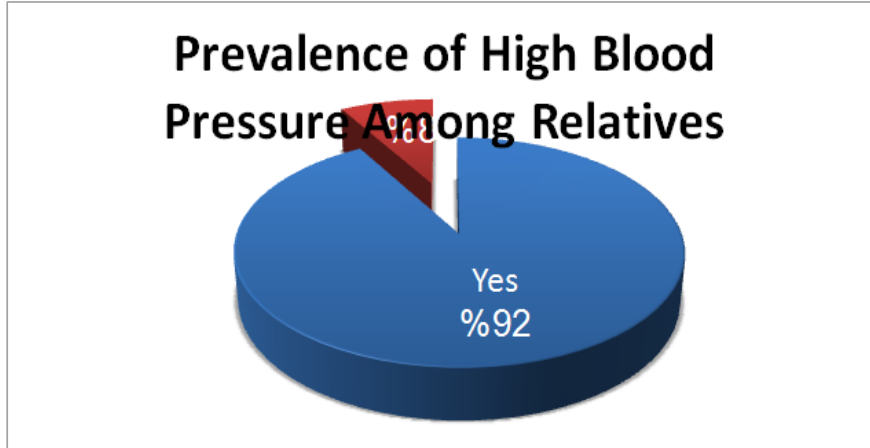
Have you been prescribed drugs to reduce high blood pressure?

		Frequency	Percent	Valid Percent
Valid	Yes	119	99.2	100.0
Missing	System	1	.8	
Total		**120**	**100.0**	

Do you Smoke?

		Frequency	Percent
Valid	Yes	40	33.3
	No	80	66.7
	Total	**120**	**100.0**
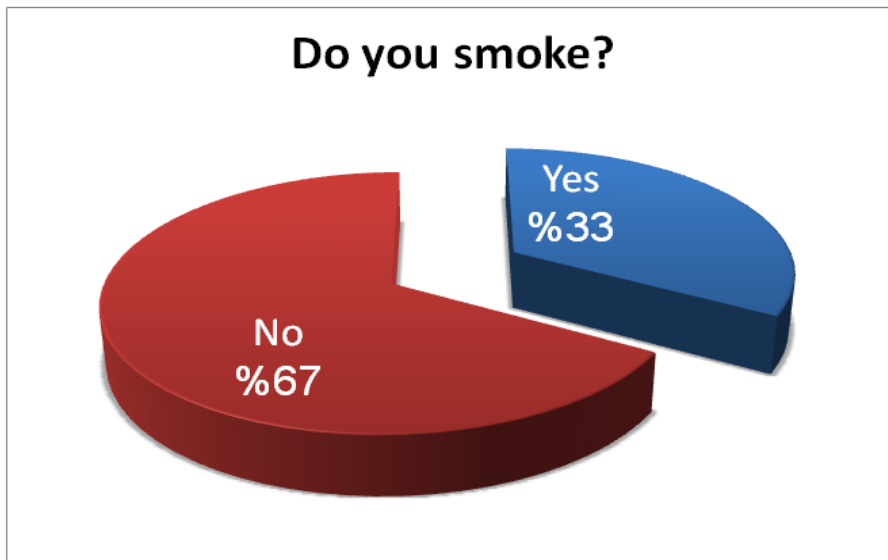
Do you do physical exercise?

		Frequency	Percent
Valid	Yes	51	42.5
	No	69	57.5
	Total	**120**	**100.0**
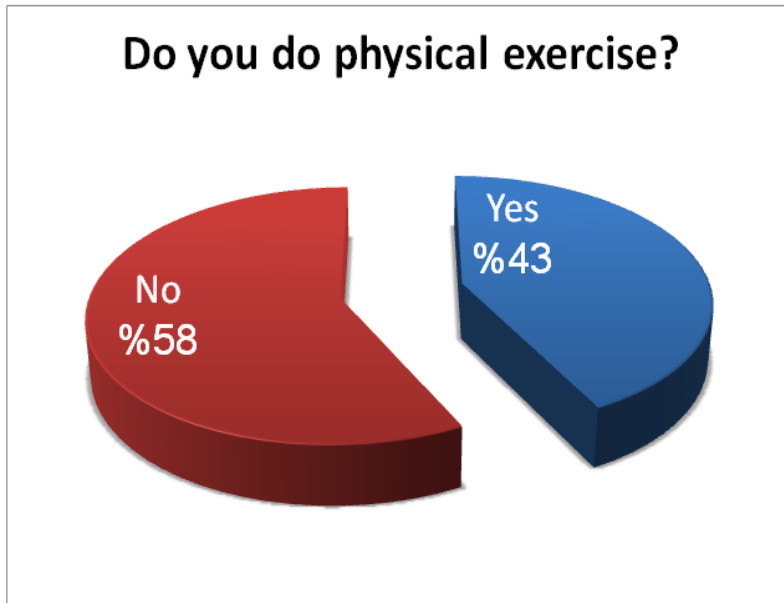
Do you know the complications of High Blood Pressure?

		Frequency	Percent	Valid Percent
Valid	Yes	104	86.7	87.4
	No	15	12.5	12.6
	Total	**119**	**99.2**	**100.0**
Missing	System	1	.8	
Total		**120**	**100.0**	
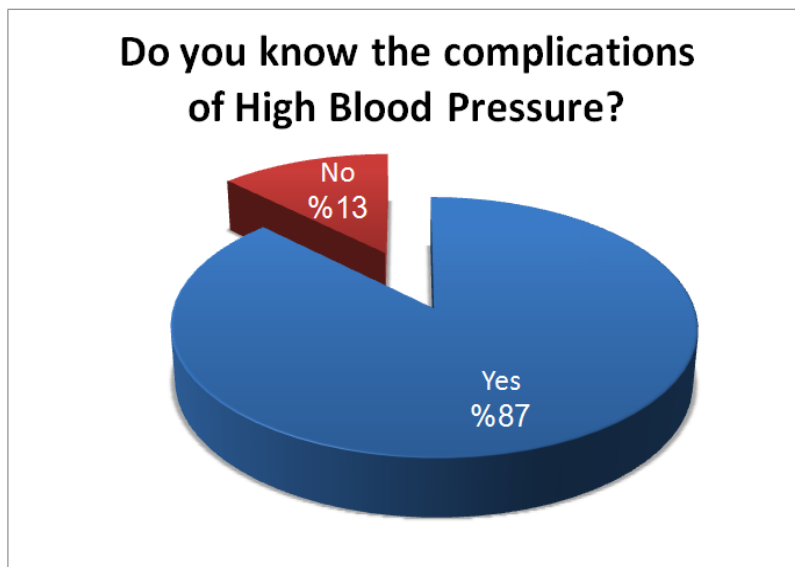
Do you know the names of the drugs?

		Frequency	Percent	Valid Percent
Valid	Yes	88	73.3	73.9
	No	31	25.8	26.1
	Total	**119**	**99.2**	**100.0**
Missing	System	1	.8	
Total		**120**	**100.0**	
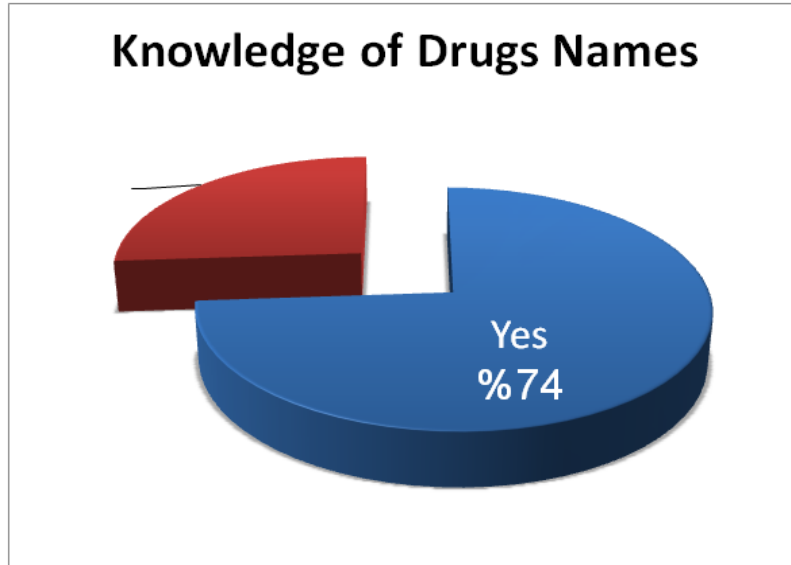
Do you take these drugs now?

		Frequency	Percent
Valid	Yes	120	100.0

Do you know the best time to take your medicine?

		Frequency	Percent
Valid	Yes	107	89.2
	No	13	10.8
	Total	**120**	**100.0**
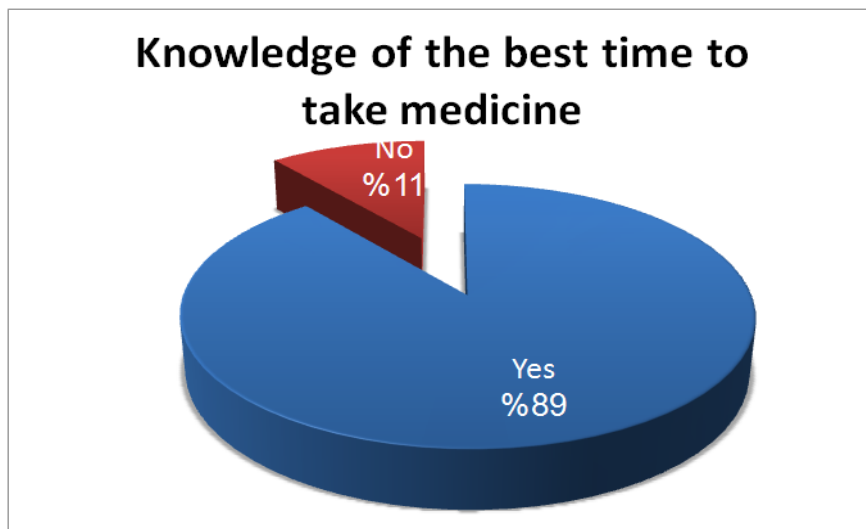
When is the best time to take the medicine?

		Frequency	Percent	Valid Percent
Valid		13	10.8	10.8
	afternoon	7	5.8	5.8
	evening	7	5.8	5.8
	morning	92	76.7	76.7
	once in the morning once in the evening	1	.8	.8
	Total	**120**	**100.0**	**100.0**

Best time to take the medicine
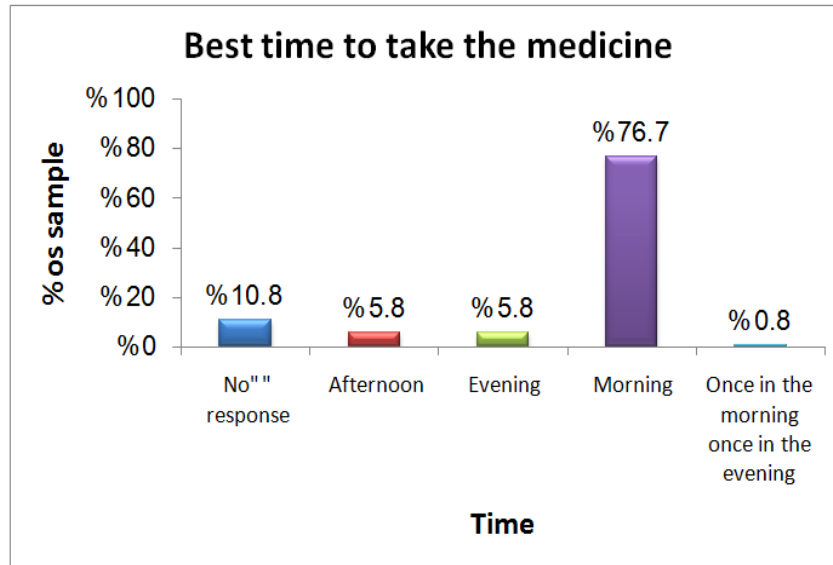
	Responses		% of the sample
	N	%	
Which class?	Diuretics	42	28.4%	35.3%
	B-Blocker	45	30.4%	37.8%
	ACE inhibitor	27	18.2%	22.7%
	ARBs	22	14.9%	18.5%
	Calcium channel Blocker	12	8.1%	10.1%
Total		148	100.0%	124.4%

		Responses		% of the sample
		N	%	
Do you have any complication?	Coronary artery disease	18	28.6%	32.7%
	Myocardial infarction	3	4.8%	5.5%
	Cardiac failure	9	14.3%	16.4%
	Renal failure	10	15.9%	18.2%
	Visual impairment	23	36.5%	41.8%
Total		63	100.0%	114.5%

	Never		Rarely		Frequently		Daily		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Do you take your medicine as prescribed?	0	.0%	12	10.0%	16	13.3%	92	76.7%	120	100.0%
Do you forget to take your medicine?	63	52.5%	42	35.0%	11	9.2%	4	3.3%	120	100.0%
Are you careless about taking your medicine?	86	71.7%	23	19.2%	7	5.8%	4	3.3%	120	100.0%
Do you stop taking your medicine because you feel better?	99	82.5%	14	11.7%	3	2.5%	4	3.3%	120	100.0%
Do you stop taking your medicine because it makes you feel worse?	102	85.0%	12	10.0%	4	3.3%	2	1.7%	120	100.0%
Do you stop taking the medication because you believe that they are ineffective?	100	83.3%	13	10.8%	6	5.0%	1	.8%	120	100.0%
Do you stop taking your medicine because you fear negative side-effects?	97	80.8%	15	12.5%	6	5.0%	2	1.7%	120	100.0%
Do you obtain a medication refill in before you run out of medicine?	5	4.2%	16	13.3%	8	6.7%	91	75.8%	120	100.0%

Mean and Standard Deviation

	Mean	Median	Std. Deviation
Age (years)	59.33	60.00	11.555
Systolic Blood Pressure	138.30	135.00	14.708
Diastolic Blood Pressure	93.43	90.00	16.212

	Mean*	Std. Deviation
Do you take your medicine as prescribed?	3.67	.653
Do you forget to take your medicine?	1.63	.788
Are you careless about taking your medicine?	1.41	.750
Do you stop taking your medicine because you feel better?	1.27	.670
Do you stop taking your medicine because it makes you feel worse?	1.22	.582
Do you stop taking the medication because you believe that they are ineffective?	1.23	.576
Do you stop taking your medicine because you fear negative side-effects?	1.28	.635
Do you obtain a medication refill in before you run out of medicine?	3.54	.878

* codes used are as follows: 1= Never, 2= Rarely, 3= Frequently, 4= Daily.

The hypertension levels were further analyzed in terms of the opinion on eight compliance aspects.

		Overall hypertension																			
		Normal or mild										Hypertensive									
		Never		Rarely		Frequently		Daily		Total		Never		Rarely		Frequently		Daily		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
9.	Do you take your medicine as prescribed?	0	.0%	2	2.7%	8	10.8%	64	86.5%	74	100.0%	0	.0%	10	21.7%	8	17.4%	28	60.9%	46	100.0%
10.	Do you forget to take your medicine?	46	62.2%	20	27.0%	6	8.1%	2	2.7%	74	100.0%	17	37.0%	22	47.8%	5	10.9%	2	4.3%	46	100.0%
11.	Are you careless about taking your medicine?	58	78.4%	11	14.9%	1	1.4%	4	5.4%	74	100.0%	28	60.9%	12	26.1%	6	13.0%	0	.0%	46	100.0%
12.	Do you stop taking your medicine because you feel better?	64	86.5%	6	8.1%	3	4.1%	1	1.4%	74	100.0%	35	76.1%	8	17.4%	0	.0%	3	6.5%	46	100.0%
13.	Do you stop taking your medicine because it makes you feel worse?	66	89.2%	6	8.1%	2	2.7%	0	.0%	74	100.0%	36	78.3%	6	13.0%	2	4.3%	2	4.3%	46	100.0%
14.	Do you stop taking the medication because you believe that they are ineffective?	68	91.9%	3	4.1%	3	4.1%	0	.0%	74	100.0%	32	69.6%	10	21.7%	3	6.5%	1	2.2%	46	100.0%
15.	Do you stop taking your medicine because you fear negative side-effects?	66	89.2%	5	6.8%	2	2.7%	1	1.4%	74	100.0%	31	67.4%	10	21.7%	4	8.7%	1	2.2%	46	100.0%
16.	Do you obtain a medication refill in before you run out of medicine?	1	1.4%	5	6.8%	5	6.8%	63	85.1%	74	100.0%	4	8.7%	11	23.9%	3	6.5%	28	60.9%	46	100.0%

Chi square

		Non-compliant		Compliant		Total	
		No.	%	No.	%	No.	%
Overall hypertension	Normal or mild	30	40.5%	44	59.5%	74	100.0%
	Hypertensive	29	63.0%	17	37.0%	46	100.0%
Total		**59**	**49.2%**	**61**	**50.8%**	**120**	**100.0%**

Chi-Square Tests

	Value	df	p-value
Pearson Chi-Square	5.747	1	.017*
N of Valid Cases	120		

* significant at 5%

Pearson Correlation results

Blood Pressure in mmHg

	Systolic Blood Pressure		
	Pearson Correlation	P-value	N
Age (years)	.407(**)	.000	120
Education	-.120	.249	94

** Correlation is significant at the 0.01 level (2-tailed).

	Diastolic Blood Pressure		
	Pearson Correlation	P-value	N
Age (years)	.370(**)	.000	120
Education	-.114	.275	94

** Correlation is significant at the 0.01 level (2-tailed).

	Systolic Blood Pressure		
	Pearson Correlation	P-value	N
Do you take your medicine as prescribed?	-.273(**)	.009	90
Do you forget to take your medicine?	.139	.193	90
Are you careless about taking your medicine?	.124	.243	90
Do you stop taking your medicine because you feel better?	.045	.677	90
Do you stop taking your medicine because it makes you feel worse?	.127	.235	90
Do you stop taking the medication because you believe that they are ineffective?	.166	.120	89
Do you stop taking your medicine because you fear negative side-effects?	.164	.122	90
Do you obtain a medication refill in before you run out of medicine?	-.282(**)	.007	90

** Correlation is significant at the 0.01 level (2-tailed).

	Diastolic Blood Pressure		
	Pearson Correlation	P-value	N
Do you take your medicine as prescribed?	-.550(**)	.000	90
Do you forget to take your medicine?	.484(**)	.000	90
Are you careless about taking your medicine?	.330(**)	.002	90
Do you stop taking your medicine because you feel better?	.267(*)	.011	90
Do you stop taking your medicine because it makes you feel worse?	.429(**)	.000	90
Do you stop taking the medication because you believe that they are ineffective?	.442(**)	.000	89
Do you stop taking your medicine because you fear negative side-effects?	.529(**)	.000	90
Do you obtain a medication refill in before you run out of medicine?	-.564(**)	.000	90

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).