Effect of an Educational Program on Compliance of Patients with Essential Hypertension toward Therapeutic Regimen

Badr Ibrahim Ahmed Abdu [(1)], Bahia Galal Abd EL-Razi [(2)] , Nadia Mohamed Taha [(3)] & Eman El-Sayed Ali El-Safty [(4)]

[(1)]Clinical instructor, Mansoura University, [(2)] Lecturer of Medical-Surgical Nursing, Faculty of Nursing, Port Said University, [(3)] Assistant Professor of Medical-Surgical Nursing, Faculty of Nursing, Zagazig University, [(4)] Professor of Cardiovascular Medicine, Faculty of Medicine, Mansoura University

ABSTRACT:

Essential Hypertension is a common chronic disease and a serious health care problem in both developed and developing countries. Compliance toward different therapeutic regimen is a key factor in controlling blood pressure. **Aim of study** was to evaluate effect of an educational program on compliance of patients with essential hypertension toward therapeutic regimen. **Subjects and methods: Research design**: A quasi experimental research design was utilized in this study. **Setting**: This research was carried out in the outpatient clinic at Specialized Medical Hospital, Mansoura University. **Subjects**: A purposive sample of 120 adult patients with essential hypertension from both sex, aged 30-60 years and on antihypertensive treatment were recruited for the current study. **Tool of data collection:** Data collected through; assessment of patients' socio-demographic characteristics, Hypertension Knowledge Level Scale, and compliance through Hill Bone Scale. **Results;** Improved patients' compliance toward therapeutic regimen post implementing program with highly statistically significant difference with $P \leq 0.001$, as well; the findings showed that a highly positive correlation between patients' knowledge and their compliance toward therapeutic regimen. **Conclusion:** The educational program was effective in the management of hypertensive patients through improving their compliance toward therapeutic regimen. **Recommendations** It is recommended to apply this program as a routine in the study setting and similar ones. In addition to design a training program for outpatient nurses about hypertension and its management.

Keywords: Essential Hypertension, Patient Education, Compliance.

Introduction:

Essential Hypertension is an internationally common disease and an important treatable public health problem. It is a major risk factor and a powerful predictor of cardiovascular morbidity and mortality with proven benefits after treatment. It produces a marked effect on patients, relatives and society [(1,2)]. Essential hypertension is defined as high Blood Pressure (BP) with no detectable medical cause or organ pathology. It is also called primary hypertension or idiopathic, which represents about 90–95% of cases [(3)].

Hypertension (HTN) affects one billion of people all over the world which is projected to increase by 60% to a total of 1.56 billion in 2025 [(4)]. Approximately 74 million of people suffer from hypertension in the United States [(5)]. In addition, in the Eastern Mediterranean Region, HTN affects 26% of the adult population [(6)], in Egypt; HTN affects about 26.3% of total population [(7)], each year at least 8 million of adult population worldwide die as a consequence of HTN [(8)].

Patient's compliance to therapeutic regimen is a critical factor for the continued health and well-being of patients with HTN. Compliance implies that patients have collaborative involvement with a health-care provider in developing and adjusting their plans, which may include pharmacologic agents as well as changes in lifestyle [(2)]. WHO estimated the compliance to pharmacotherapy for HTN at worldwide in between 50-70% and identified poor compliance as the main cause of failure to control HTN [(9)].

Educational programs can be beneficial in the treatment of chronic diseases as hypertension; there is a wide support for education strategies

in prevention and treatment of noncompliance. The educational interventions are based on the assumption that inadequate information is the main cause of poor compliance [10].

Nurses have important responsibilities in the successful management of HTN such as providing patients with healthy lifestyle behaviors and with consultancy services for increasing their compliance to the disease and medication use [11].

Significance of the Study:

Increased BP remains one of the greatest health and economic issues facing world Egypt, in addition the importance of blood pressure (BP) control in reducing morbidity and mortality by preventing hypertensive complications [12, 13]. Based on recent studies, it was found that the highest noncompliance toward therapeutic regimen, as well; good control and increasing the knowledge, awareness of BP will result in prolonged survival [2, 14]. So, there is an essential need to conduct this study to evaluate the effect of an educational program on compliance of patients with essential hypertension toward therapeutic regimen.

Aim of the Study:

Evaluate effect of an educational program on compliance of patients with essential hypertension toward therapeutic regimen.

Research Hypothesis:

H_1- the level of knowledge for studied patients' will be better than before implementing the program.

H_2-Patients' compliance to therapeutic regimen will be increased than before implementing the program.

Subjects and Methods:

Research design:

A quasi experimental research design was used in this study.

Study setting:

The study was conducted at the cardiac outpatient clinic at Specialized Medical Hospital, Mansoura University.

Study Subjects:

A purposive sample of 120 adult patients with essential hypertension from both sex, aged 30-60 years and on antihypertensive treatment, for at least one year was recruited for this study. The exclusion criteria: Patients who unable to communicate and have chronic liver disease, chronic kidney disease, and vlvular heart disease.

Tools for Data Collection:

Three tools were used for data collection:

Tool I: A structured Interviewing questionnaire: This tool was developed by the researcher and included two parts: first part**:** patients' socio-demographic data**:** included age, sex, marital status, educational level, occupation, and monthly income. Second part**:** was for medical history included: patient's present, past, and family history.

Third part**:** patient's clinical measures including; measuring blood pressure and BMI.

Tool II: Patients' Knowledge Interviewing Structured Schedule: included two parts: Part 1: Hypertension Knowledge Level Scale (HK-LS): It was adapted by the researcher from Erkoc et al. [15]**;** the scale consists of 34 items with six sub-dimensions (definition, etiology, medical treatment and complications of hypertension, as well as the attitudes and behaviors about drug compliance, diet, and their lifestyle). Part 2: developed by the researcher and consisted of 4 closed ended questions about hypertension, such

as: signs, symptoms, its causes, risk factors, and precautions of measuring blood pressure. The score one was given for each correct answer and zero for incorrect or don't know statements. These scores were converted into a percent score. The total knowledge score of each item was considered satisfactory if the percent score was 50% or more and unsatisfactory if less than 50%.

Tool II: Hill-Bone Compliance High Blood Pressure Therapy Scale: This scale was constructed by Hill et al. [16], to assess patient compliance for three important behavioral domains of high blood pressure treatment: 1) reduced sodium intake, contains 3 items assessing dietary intake of salty foods. 2) Appointment keeping, contains 2 items assessing appointments for doctor visits and prescription refills and 3) Medication taking, contains 9 items assessing medication taking behavior.

Scoring system:

Items are assumed to be additive and when summed, the total score ranges from 14 (minimum) to 56 (maximum).

Content validity and reliability:

It was ascertained by seven jury of expertise from medical and nursing staff and necessary modifications were done. The reliability of the tool (2&3) was tested using the internal consistency method. It is proved to be high with Cronbach's alpha reliability coefficients (0,808, 0.922).

Ethical considerations:

The researcher obtained Patient's informed verbal consent to participate in the study after explaining the study aim and phases. Patients were knowledgeable about their rights to refuse or withdraw, and about confidentiality of the information obtained. The study measures could not cause any risk effect on patients. Professional help was provided by the researcher to them as needed.

Pilot study:

A pilot study was carried out on 12 patients with essential hypertension (10% of the sample) to test clarity, objectivity and applicability of the study tools as well as estimation of the time needed to fill the questionnaire. Required modifications were done in the form of added of some questions as (patients' knowledge about HTN.....etc.). Patients' involved in the pilot were excluded from the study.

Field work:

Data was collected through a period of one year from August 2014 to July 2015. Three days/week from 9 A .M to 12.30 P.M. After explanation the purpose of the study to the patients who agreed to participate in the study. The study was conducted through four main phases: 1) assessment; 2) planning, 3) implementation and 4) evaluation.

A. Assessment phase:

This phase aimed to assess the studied patients' characteristics, patients' knowledge level and their compliance toward therapeutic regimen. Each adult hypertensive patient was interviewed individually before applying the planned program to collect the baseline patient's data using all study tools.

B.Planning phase:

Educational program was planned and developed based on the findings of the assessment phase, and in the light of related literature. Program was designed to improve patients' knowledge, and their compliance toward therapeutic regimen. The program stressed on improving patient's knowledge regarding hypertension. It included the following items as illustrated in the patient's booklet: identifying of hypertension, normal value of blood pressure, classifications, its types, causes, risk

factors, investigations, signs and symptoms, diagnosis, complications. It also enclosed the explanation of the pharmacological and non-pharmacological therapy for HTN.

The intervention also covered the importance of compliance practice toward therapeutic regimen, which emphasized on eating sensibly, reducing salt, fat, caloric and sugar intake, regular follow-up with the physician, exercise regularly and reducing weight, stop smoking, compliance with prescribed medication and do daily aerobic exercise, the importance and means to measure Body Mass Index (BMI), the method of measuring blood pressure. Teaching methods were selected to suit teaching of small groups in the form of lectures, group discussion, brain storming, demonstration, and re-demonstration to facilitate comprehension and integration of theory and practice. Also teaching media were prepared as power point presentations, CD films, colored posters, and booklet that covered theoretical and practical information.

C. Implementation phase:

Each patient with essential hypertension in the study subjects or one of their families in the outpatient clinics of the previous hospital received the developed educational program according to their needs and suitable for their level of understands. The session's numbers were three sessions per week for each patient and continued until patients or their relatives become more satisfied with the provided knowledge. Each session lasted for around 30-35 minutes. Each patient received 4 sessions. In each session the researchers used face to face teaching methods in order to achieved the proposed goal and allow patient to asking, discussion and reach high level of understanding. Each session divided into two parts (first part take around 25 minutes concentrated on theoretical knowledge and second part take around 10 minutes for discussion, asking and answering any question). During these sessions researcher used illustrations, examples of objects, lectures, and pamphlet and power point presentations.

Regarding practical sessions: it were 8 sessions according to patients or their relatives' level of understanding for the given skills, each session lasted around 45 minutes, during it patients and/or one of his/her family learn how measuring weight, height, BMI, how to prepare the appropriate diet (types and amount). In addition to learn relaxation technique practices as how done muscle relaxation, imaginary technique and the meditation therapy. And also the technique of measuring blood pressure. Lastly; learn patients' how care epistaxis, bleeding gum, edema of legs and feet. The instructional booklet was given to each patient or his relatives to attract his/her attention, motivate his/her, and help for reviewing at home and support teaching at home.

D. Evaluation phase:

Two evaluations were conducted for each patient in the study; first one was at the beginning of the study as a base line data for developing the educational program according to patients' needs. Second evaluation occurred immediately after completion of the program to detect the effect of program on patients' level of knowledge, and their compliance to hypertensive regimen using the study tool II and Tool III.

Administrative design:

After explaining the aim of the study an official approval was obtained from the director of the hospital.

Statistical analysis:

Data was analyzed using SPSS (Statistical Package for Social Sciences) version 15. Qualitative data was presented as number and

percent. Comparison between groups was done by Chi-Square test. Wilcoxon singed ranks test was used for comparison within group. Quantitative data was tested for normality by Kolmogrov-Smirnov test. Normally distributed data was presented as mean ± SD. Paired t-test was used for comparison within groups. Pearson's correlation coefficient was used to test correlation between variables. P < 0.05 was considered to be statistically significant.

Results:

Table 1: shows the demographic characteristics of the studied subjects that 46.7% of them were within age group 50 - < 60 years with mean age 48.50 ± 7.89 years. 54.2% of the studied subjects were females, and 75.0 % of them were married. In addition to; 40.8% of the studied subjects were housewives, and 55.0% of them were illiterates

Table 2: demonstrates the medical health history of the studied subjects that 75.8% of them had positive family history of hypertension with 78.1% first degree of relativity, 44.2% of them had hypertension since one year to less than five years with mean duration 5.82 ± 3.56 years, in addition to 63.4% of the studied subjects had both non-pharmacological and pharmacological treatment as regimen prescribed.

Table 3: shows that there was a highly statistically significant difference in systolic blood pressure and diastolic blood pressure pre/post program with p < 0.001. The table also illustrates that there was a highly statistical significant differences in relation to BMI of the studied sample pre / post program.

Figure 1: clarifies that 49.7% of the studied sample had over weight, however only 2.5% were morbid obesity with mean ± SD = 30.42± 4.05 pre-program, while 54.5% of the studied sample had over weight and none of them (0,0%) had morbid obesity with mean ± SD=29.57± 3.3 post program.

Table 4: illustrates that there was a highly statistically significant improvement in total knowledge scores pre/post program with p<0.001. There was only 15.8% of the studied subjects had satisfactory knowledge scores pre-program, improved to 80.0% post program.

Table 5: reveals that there was a highly statistically significant difference between total compliance score pre/post program with p value <0.001. It was noticed that only 20.0% of the studied subjects were compliance toward different therapeutic regimen pre-program, raised to 76.7% post program.

Table 6 : reveals that patients' knowledge correlated positively with the compliance of hypertensive patients' pre/post program with a highly statistically significant relation with P. value 0.000.

Table 7: there were statistically significant relations between hypertensive complications and patients' compliance toward therapeutic regimen preprogram with P. value 0.02 & 0.01 respectively.

DISCUSSION:

Hypertension is a common chronic disease amenable to control by appropriate medication or adopting relevant lifestyle modifications. However, a lack of knowledge about the severity of the disease and the importance of adhering to the prescribed treatment, cost and a lack of motivation to make some lifestyle changes in terms of diet and physical exercise may constitute barriers to compliance behavior [(17)].

A structured educational program is a foundation and integral components of any intervention, eventually results in better blood pressure control, improves adherence with therapeutic regimen [18].

Regarding age; the risk of having hypertension increases with age [19]. This is supported with the findings of the present study, nearly half of the studied subjects aged 50 - < 60 years. This is may be due to the age-related changes in arterial stiffness and decreased elasticity and also the present results are supported by the idea that the incidence rate of HTN increase with age and primary hypertension typically occurs between the ages of 30 -< 60.

The same findings were confirmed in other studies carried out by Awad , Ahmed , and Pinprapapan et al. [20, 2, 21] who they found that the majority of their studied sample was in the same age group. But this finding is in contrast with Wright et al [22] who investigated the prevalence of hypertension by age group and gender, found that a high prevalence of hypertension among older adults. These differences may be due to different setting and different criteria of sampling.

The present study showed that hypertension was encountered more among females than males. This may be attributed to the effect of premenopausal hormones in protection against cardiovascular diseases. Also, it may be related to the presence of modifiable risk factors as obesity, stressful life situation which have more influence females rather than males. The same findings were supported by Okoro et al ,Saeed et al. [23, 24], who reported that females have hypertension more than males. But this finding is in contrary with Ahmad et al. (2012), Iyalomhe & Iyalomhe (2010) [25, 26], who reported that males have hypertension more than females and Wilkins et al. [27] who reported that the rate of hypertension was nearly equal between men and women. These differences may be attributed to differences in age group in these studies, in addition to sociocultural differences.

More than three quarters of hypertensive patients of this study had positive family history of hypertension; most of them were first degree relatives. These findings reflect the fact of hereditary factors play a major role in the expression of hypertension and history of a close blood relative (e.g., parents, siblings) with hypertension is associated with an increased risk for developing hypertension [28]. This finding is in agreement with Ahmed, Abed & Abu-Haddaf [2,6], who reported that more than half of their studied sample had positive family history of hypertension.

The main finding of present study was the success of implementation the program in control BP which revealed significant decline in systolic and diastolic blood pressure among patients. This may be justified by the fact proven in this study that lifestyle patterns correlated significantly with control of systolic and diastolic blood pressure which means that high adoption of healthy lifestyle associated with better blood pressure control. The previous findings are consistent with the findings of Weheida et al ,Park et al, [29, 30], who reported reduction in blood pressure measurement in the study group after the program.

In the same line Rigsby, Hong [31, 32] conducted a study on lifestyle modifications, which has provided strong evidence that a variety of lifestyle modification interventions affect lower BP and to reduce the incidence of high BP.

The findings of this study found that there were more overweight and obese participants than normal participants after implementation with slightly decrease in all level of BMI for studied subjects with highly statistical

significant difference between them. This may be due to the change in body weight would be expected on a long-term basis, and not within the two to three-month follow-up period of the present study. Obesity and overweight are important risk factors contributing to the development of hypertension. This result goes in the same line with Gajewska et al, Achieng et al [33, 34], who found that the majority of the studied subjects had moderate obesity. But these findings are in disagreement with Abed & Abu-Haddaf [6], who found that the majority of the studied sample had morbid obesity.

An important component in the treatment guideline for hypertension is the recommendation for patients' education. Patients' education is an important strategy in improving adherence and can be seen as foundation of most patients focused intervention [35].The present study showed that implementation of the educational program improved knowledge of post program comparing to preprogram with highly statistical significant difference. This result was in congruence with Mersal & Mersal, Al-Wehedy et al [36, 37], who illustrated that lifestyle modification session improved the knowledge scores of the studied subjects of hypertensive patients with highly statistical significant difference between two groups. On the same line, a study done by Yang et al [38] which conduced 25 day health education about hypertension, revealed that the overall knowledge of all patients received the educational program were significantly improved after the program.

There is no doubt that if patients are not fully informed about the risks of hypertension and for the need of effective and prolonged treatment, their compliance to long treatment for HTN has been considered very low and unsatisfactory, for that, any educational interventions are based on the assumption that inadequate knowledge is the main cause of poor compliance, so any educational interventions should be individualized and include an assessment of patient's level of knowledge and cultural background [39, 10].

The current study findings come in accordance with the previous studies, as the majority of the present study sample was non-compliance before implementing the program and only one fifth of them complied with therapeutic regimen. This could be due to lack of continuous teaching to patients and improper communication between patients and health care providers. This approach is also supported by Zeid et al.Hassan [40, 14] who reported that patient education plays a fundamental role in successful management of hypertension.

The present study results demonstrated marked improvement in compliance rate to hypertension regimen after the educational program. These mean that total compliance to all hypertensive regimens significantly improved. This could be due to that the educational program is based on patients' needs. This result is congruent with a study done by Hadi & Rostami-Gooran [41], who stated that all patients showed an improvement in their compliance to hypertensive regimen.

Many factor affect the patients compliance, these may be either related to demographic feature of the patients such as age, gender, level of education, occupation, family size, monthly income, residence, family history and duration of illness. The current study showed that there was a statistically significant relation between patients' age and their compliance to treatment regimen. These may be explained by the fact that older patients tend to be more scared of disease; consequently, they have fear of death than younger ones, so they comply with the medical regimen imposed by the disease. Also this contradiction may be explained as

these studies included different age categories younger and older age.

This current finding is in accordance with Ingram , Gatti et al [42, 43], who reported that age of patients was a significantly correlated with compliance rate, however this finding contradicted with Al–Banna & Mohmed [44] who reported that there was no relation between age and compliance rate.

In the present study revealed that there was a statistically significant relation between occupation and compliance to treatment regimen of patient with hypertension as the worked patients had monthly income and economic conditions may affect their compliance particularly if the drug is expensive or if the patients are receiving multiple drugs.

This result is supported by Salem & Hassan [45], who reported that there was a significant relation between compliance and occupation. But this result is in contrast with Ingram [42], who found that there was no a significant relation between compliance and occupation. These differences may be due to the level of lifestyles found at every country.

Effective management of HTN depends on patients' understanding of their condition, treatment regimen and adherence to lifestyle/ pharmacological treatment. Increasing patients' knowledge about the disease can achieve the goal of treatment, empower patients to make decision about their treatment, and can empower their motivation and intention to adhere with the treatment regimen [46, 47]. This is in accordance with the findings of the present study which proven a significant strong correlation between acquiring knowledge and adopting a healthy lifestyle, indicating that individuals have better knowledge are more likely to have higher cognitive function so that they may understand the necessity of lifestyle changes and more motivated to adopt healthy lifestyle and adhering with the treatment regimen.

The same findings were reported in another study conducted by Soliman Ulig & Leppée, and Saleem et al. [10, 48, 49], revealed that educating the patients about the disease and clarifying doubts regarding treatment directly connected with better control of hypertension. In contrast, other studies conducted by Ahmed, Hassan, and Guirado et al [2, 14, 50], revealed no relation between knowledge about hypertension and compliance with therapeutic treatment to control blood pressure. This is may be justified by knowledge was not enough to achieve compliance and changing in lifestyle because knowledge is not the only component to achieve the goal, but also positive attitude and behaviors. *And also Ambaw et al* [51] concluded that knowledge about hypertension and its treatment was found to be positively associated with adherence behavior. Patients with better awareness were more likely to adhere to their treatment.

The present study indicated that there was a statistically significant relation between patients' complications found and compliance toward different therapeutic regimen. These can be explained as HTN is a chronic condition that leads to serious complications if the person cannot control the blood pressure. Patient's compliance to therapeutic regimens is a critical factor for the continued health and well-being of patients with HTN. Non-adherence to therapeutic regimen is a significant problem with patient with HTN especially elderly person because it can lead to increased morbidity and mortality and increase cost of treatment [9].

This finding is in agreement with *Ambaw et al* Alwey [51, 52], who reported that there was a significant relation between the complications and the compliance of patients with essential hypertension. But this finding is in contrary with Ahmad et al.

Mweene et al. [25, 53], who reported that patients with co-morbid medical conditions did not show any statistically significant association with adherence.

CONCLUSION:

The main findings of the present study were the success of implementation of the educational program in control BP, improved patients' knowledge post program comparing to preprogram with highly statistical significant difference. In addition the educational program was enhanced compliance toward therapeutic regimen post program than before implementing the program with highly statistically significant difference. As well; the findings showed that a highly positive correlation was found between patients' knowledge and their compliance to therapeutic regimen. And also influenced significantly by their socio-demographic data, and also affected by hypertensive complications.

RECOMMENDATIONS:

- A comprehensive treatment plan should be provided for the patients with HTN in outpatient clinics to help the patients and their caregivers to understand and follow accurately the required therapeutic regimen.

-Designing a training program for outpatient nurses about hypertension and its management and proper ways to provide health education and appropriate counseling for hypertensive patients in order to improve compliance**.**

– .

Table 1: Demographic Characteristics of Patients with Essential Hypertension (n=120):

Item	No	%
Age groups (in years):		
30 -	17	14.2
40 -	47	39.1
50-60	56	**46.7**
Mean **±** SD = **48.50 ± 7.89**		
Gender:		
Male	55	45.8
Female	65	**54.2**
Marital status:		
Single	6	5.0
Married	90	**75.0**
Divorced	7	5.8
Widower	17	14.2
Occupation:		
Housewife	49	40.8
Private sector	34	28.4
Governmental	30	25.0
Retired	7	5.8
Level of education		
Illiterate	66	55.0
Read & write	24	**19.3**
Secondary	22	19.0
University	8	6.7

Table 2: Medical History of Patients with Essential Hypertension (n=120):

Item	No	%
Family history of hypertension		
Positive	91	**75.8**
Negative	29	24.2
Degree of relativity		
1st degree	71	**78.1**
2nd degree	20	21.9
Duration of hypertension:		
1-	53	**44.2**
5 -	47	39.1
≥10	20	16.7
Mean **±** SD = **5.82 ± 3.56**		
Treatment regimen:		
Non pharmacological treatment	25	20.8
Pharmacological treatment	19	15.8
Both (non-pharmacological treatment & pharmacological treatment)	75.6	**63.4**

Table 3: Comparison of Mean Blood Pressure and Body Mass Index [BMI] of Patients with Essential Hypertension Pre/Post Program (n=120):

Variable	Preprogram		Post program		T	P- value
	Mean	±SD	Mean	±SD		
Systolic BP	152.10	8.86	145.47	6.25	10.124	0.000**
Diastolic BP	94.60	5.84	89.57	5.29	10.380	0.000**
BMI	30.42	4.05	29.57	3.30	8.567	0.000**

*Significant ≤ 0.05 ** Highly Significant ≤ 0.001

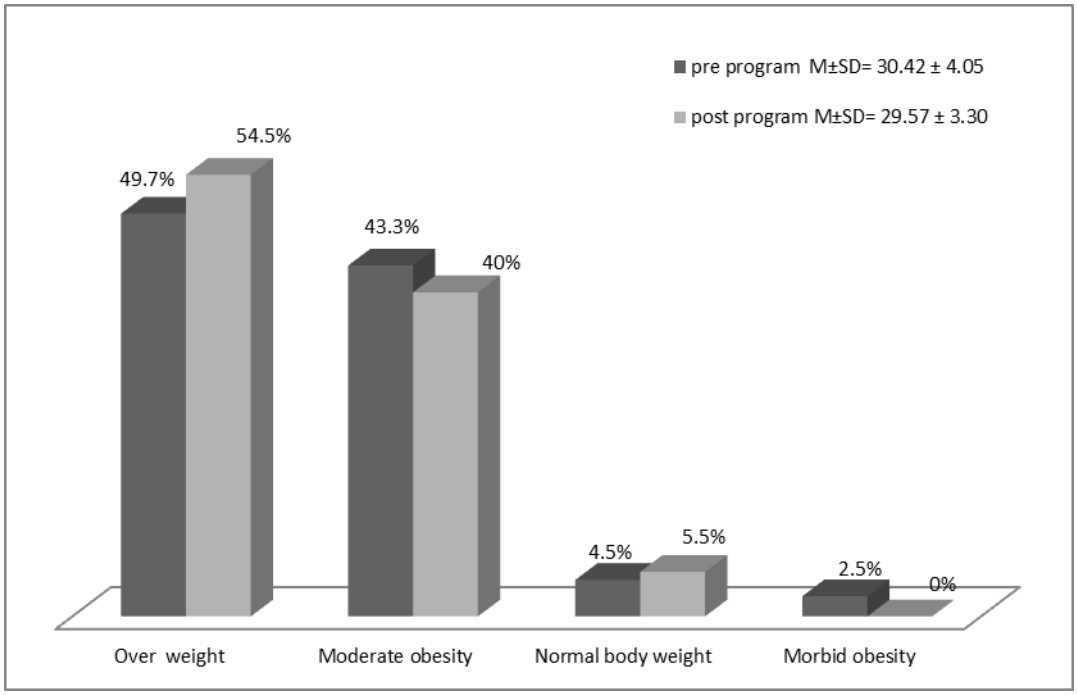

Figure 1: Body Mass Index of Patients with Essential Hypertension Pre / Post Program (n=120):

Table 4: Patients' Knowledge about Hypertension Pre/Post Program (n=120):

Patient's Knowledge	Pre program				Post program				Test of significance	
	Satisfied		Unsatisfied		Satisfied		Unsatisfied		Z-value	p-value
	no.	%	no.	%	no.	%	no	%		
Through HK-LS:										
Definition.	30	25.0	90	75.0	95	79.2	25	20.8	-8.062	0.000
Medical Treatment.	26	21.7	94	78.3	91	75.8	29	24.2	-8.062	0.000
Drug compliance.	17	14.2	103	85.8	89	74.2	31	25.8	-8.485	0.000
Life style.	21	17.5	99	82.5	96	80.0	24	20.0	-8.660	0.001
Diet.	44	36.7	76	63.3	108	90.0	12	10.0	-8.000	0.000
Complication.	62	51.7	58	48.3	113	94.2	7	5.8	-7.005	0.000
Total:	22	18.3	98	81.7	96	80.0	24	20.0	-8.602	0.000
Patient's Knowledge about										
Signs and symptoms of HTN.	70	58.3	50	41.7	117	97.5	3	2.5	-6.856	0.000
Causes of HTN	44	36.7	76	63.3	114	95.0	6	5.0	-8.250	0.001
Risk factors of HTN	21	17.5	99	82.5	86	71.7	34	28.3	-8.062	0.000
Preventive measures of HTN	48	40.0	72	60.0	116	96.7	4	3.3	-8.246	0.000
Total:	24	20.0	96	80.0	99	82.5	21	17.5	-8.660	0.000
Total knowledge score	19	**15.8**	101	84.2	96	**80.0**	24	20.0	-8.775	**0.000**

** Highly Significant ≤ 0.001.

Table 5: Patients' Compliance through Hill - Bone Scale Pre / Post Program (n=120):

Patients' Compliance	Pre program		Post program		Test of significance	
	compliance	Non-compliance	compliance	Non-compliance	Z-value	P-value
	%	%	%	%		
Compliance to Medication	20.8	79.2	69.2	30.8	-7.616	<0.001
Compliance to Diet	15.8	84.2	59.2	40.8	-7.076	<0.001
Compliance to Follow-up	26.7	73.3	79.2	20.8	-7.937	<0.001
Total Compliance Score	**20.0**	80.0	**76.7**	23.3	-8.246	**<0.001**

Highly Significant ≤ 0.001

Table 6: Correlations between Total Knowledge Scores, and their Total Compliance Scores Pre / Post Program (n=120).

Items	Total knowledge			
	Pre program		Post program	
	R	P value	r	P value
Total compliance	0.356	0.000**	0418	0.000**

** Highly Significant ≤ 0.001

Table 8: Relations between Complications of Patient with Essential Hypertension and Total Compliance toward Therapeutic Regimen Pre / Post Program (n = 120):

variables / Patients' Complication	Patients' compliance			
	Pre program		Post program	
	compliant	Non-compliant	compliant	Non-compliant
	%	%	%	%
Hypertensive heart diseases	57.5	42.5	67.8	32.2
Retinal damage	35.8	64.2	58.7	41.3
Test of significance				
X^2	5.742		1.135	
p-value	0.01*		0.287	

*Significant ≤ 0.05 ** Highly Significant ≤ 0.001

Table 7: Relations between Socio-demographic Characteristics and Total Compliance Scores of Patients with Essential Hypertension Pre / Post Program (n=120):

Patients' Compliance / Socio-demographic Characteristics	Pre program				Test of significance		Post program				Test of significance	
	Compliant		Noncompliant		X^2	P-value	Compliant		Noncompliant		X^2	P-value
	No	%	No	%			No	%	No	%		
Age groups (in years)												0.166
0	0	0.0	17	100.0			13	76.5	4	23.5		
30 -	8	17.0	39	83.0	7.082	**0.02***	32	68.1	15	31.9	3.586	
40 -	12	28.6	40	71.4			47	83.9	9	16.1		
50 – 60												
Gender												0.164
Male	11	20.0	44	81.5	0.420	0.810	44	81.8	11	18.2	3.610	
Female	14	21.4	51	78.5			49	75.4	16	24.6		
Marital status												0.07
Single	2	33.3	4	66.7	2.554	0.466	2	33.3	4	66.7		
Married	15	16.7	75	83.3			71	78.9	19	21.1	6.961	
Divorced	2	28.6	5	71.4			5	71.4	2	28.6		
Widowed	5	29.4	12	70.6			14	82.4	3	17.6		
Residence												0.07
Urban	8	21.1	30	78.9	0.039	0.844	33	86.8	5	13.2	3.219	
Rural	16	19.5	66	80.5			59	72.0	23	28.0		
Level of education												0.755
Illiterate	12	18.2	54	81.8			52	78.8	14	21.2		
Read & write	4	17.4	19	82.6	0.892	0.827	17	73.9	6	26.1	1.194	
Secondary	6	26.1	17	73.9			18	78.3	5	21.7		
University	2	25.0	6	75.0			5	62.5	3	37.5		
Occupation:												0.471
Governmental	10	33.3	20	66.7			26	86.7	4	13.3		
Private sector	1	2.9	33	97.1	11.808	**0.008***	24	70.6	10	29.4	2.523	
Housewife	10	20.4	39	79.6			37	75.5	12	24.5		
Retired	3	42.9	4	57.1			5	71.4	2	28.6		
Total	24	20.0	96	80.0			92	76.7	28	23.3		

*Significant ≤ 0.05 ** Highly Significant ≤ 0.001

References:

1. Del les C. & Dominiczak A.: Arterial Hypertension: New Stakes for the New Century; *Medicographia. 2012;* 34: 3-10.
2. Ahmed B.: Factors Affecting Compliance of Patients with Essential Hypertension toward Therapeutic Regimen. Published Master Thesis, Faculty of Nursing, Port Said University, 2014; 4-90.
3. Coffman T.: Under Pressure: The Search for the Essential Mechanisms of Hypertension; *Nat Med. 2011;* 17(11):1402-9.
4. Sadeghi M., Shiri M., Roohafza H., Rakhshani F., Sepanlou S. & Sarrafzadegan N.: Developing an Appropriate Model for Self-Care of Hypertensive Patients: First Experience from EMRO; *ARYA Atheroscler, 2013;* 9(4): 232-40.
5. Wagner S., Lau H., Tamas F. & Gupta Sh.: Impact of Medication Adherence on Work Productivity in Hypertension. *Am J Pharm Benefits.2012;* 4(4):88-96.
6. Abed Y. & Abu-Haddaf S.: Risk Factors of Hypertension at UNRWA Primary Health Care Centers in Gaza Governorates; *ISRN Epidemiology. 2013*; 72 (60): 9.
7. World Health Organization: Country Cooperation Strategy for WHO and Egypt 2010–2014. Design and layout by Pulp Pictures Printed by WHO Regional Office for the Eastern Mediterranean. 2015; Cairo.
8. Jaiyungyuen U., Suwonnaroop N., Priyatruk P. & Moopayak K.: Factors Influencing Health-Promoting Behaviors of Older People with Hypertension. Mae Fah Luang University International Conference 2012; Available at: uma_korn4@hotmail.com. Accessed on: 20 Jan. 2014, 8 Am; Pp. 1-9.
9. Alhalaiqa F., Deane K., Nawafleh A., Clark A. & Gray R.: Adherence Therapy for Medication Non-Compliant Patients with Hypertension: A Randomised Controlled Trial; *J Hum Hypertension. 2012*; 26(2): 117–26.
10. Soliman H.: Impact of an Educational Program on Compliance to Therapeutic Regimen among Patients with Arterial Hypertension. Unpublished Dissentation thesis, Faculty of Nursing, Ain Shams University, 2007; 5-98.
11. Al-Wehedy A., Abd El-Hameed SH. & Abd El-Hameed, D.: Effect of Lifestyle Intervention Program on Controlling Hypertension among Older Adults; *Journal of Education and Practice. 2014;* 5(5): 61-71.
12. Hagendorff A., Freytag S., Muller A. & Klebs S.: Pill Burden in Hypertensive Patients Treated with Single-Pill Combination Therapy–An Observational Study; *AdvTher. 2013;* 10(13):1- 14.
13. Joho A.: Factors Affecting Treatment Compliance among Hypertension Patients in Three District Hospitals – Dar Es-salaam. Published Thesis; Master degree, Muhimbili University of Health and Allied Sciences, 2012; 3-47.
14. Hassan N.: Compliance of Hypertensive Elderly Patients with the Treatment Regimen. Unpublished Thesis, Master of Thesis, Faculty of Nursing, Mansoura University, 2009; 3-79.
15. Erkoc S., Isikli B., Metintas S. & Kalyoncu C.: Hypertension Knowledge-Level Scale (HK-LS): A Study on Development, Validity and Reliability; *Int J Environ Res Public Health*. 2012; 9 (3): 1018–29.
16. Hill M., Bone L., Kim M. & Levine D. Development and Testing of the Hill-Bone Compliance to High Blood Pressure Therapy Scale; *Progress in Cardiovascular Nursing. 2000*; 16: 90-96.
17. Awad E., Gwaied B., Fouda L., & Essa H.: Compliance of Hypertensive Patients with Treatment Regimen and Its Effect on Their Quality Of Life; *IOSR Journal of Nursing and Health Science.2015;* 4(2): 26-36.
18. Lewis L., Dirksen S., Heitkemper M., Bucher L., camera M. & Collier I. Medical Surgical Nursing: Assessment and Management of Clinical Problems. 9th ed. Philadelphia; Mosby Year Book, 2011.
19. Winter K., Tuttle L. & Viera A.: Hypertension; *Prim. Care Clin. Office Pract.2013;* 40(13): 179 - 194.
20. Awad E.: Compliance of Hypertensive Patients with Treatment Regimen and Its Effect on Their Quality Of Life. Dissentation Thesis, Faculty of Nursing, Tanta University, 2015; 6-66.
21. Pinprapapan K., Panuthai S., Vannarit T. & Srisuphan W.: Casual Model of Adherence to Therapeutic Regimens among Thais with Hypertension; *Pacific Rim Int J Nurs Res. 2013;* 17(3): 268-81.
22. Wright J., Hughes J., Ostchega Y., Yoon S. & Nwankwo T.: Mean Systolic and Diastolic Blood Pressure in Adults Aged 18 and Over in the United States, 2001-2008; *Natl. Health Stat. Reports. 2011;* 35: 1-23.
23. Okoro R. & Ngong C.: Assessment of Patient's Antihypertensive Medication

Adherence Level in Non-Comorbid Hypertension in A tertiary Hospital in Nigeria; *Int J Pharm BiomedSci. 2012;* 3(2), 47-54.
24. Saeed A., Kutbi A., Choudhry A., & Nooh R.: Prevalence, Awareness, Treatment, and Control of Hypertension among Saudi Adult Population: A National Survey; *International Journal of Hypertension. 2011;* 4 (6): 135-74.
25. Ahmad N., Hassan Y., Tangiisuran B., Meng O., Aziz N. & Khan A.: Guidelines Adherence and Hypertension Control in an Outpatient Cardiology Clinic in Malaysia; *Tropical Journal of Pharmaceutical Research. 2012*; 11 (4): 665-672.
26. Iyalomhe G. & Iyalomhe S.: Hypertension Related Knowledge, Attitudes and Life-style Practices among Hypertensive Patients in a Sub-Urban Nigerian Community; *Journal of Public Health and Epidemiology. 2010;* 2(4): 71-77.
27. Wilkins K., Campbell N. & Joffres M.: Blood Pressure in Canadian Adults; *Health Reports. 2010;* 21(1): 37–46.
28. Smeltzer S. & Bare B. Brunner and Sauddarth's Text Book of Medical – Surgical Nursing: Hypertension.12th Ed. Philadelohia: Lippincott Co., 2010.
29. Weheida S., Ahmed H. Shehata A. & Shaala S.: Effect of Walking and Breathing Exercise on Controlling Hypertension; *Alexandria Nursing Science Journal. 2009;* 8(1): 105-33.
30. Park Y., Song M., Cho B., Lim J., Song W., Kim S.: The Effects of an Integrated Health Education and Exercise Program in Community-Dwelling Older Adults with Hypertension: Randomized Controlled Trial; *Education and Counseling. 2011;* 82(2):133-37.
31. Rigsby B.: Hypertension Improvement through Healthy Lifestyle Modifications; *ABNF J. 2011;* 22(2):41- 43.
32. Hong W.: Evidence-Based Nursing Practice for Health Promotion in Adults with Hypertension: A Literature Review; *Asian Nurs. Res.2010;* 4(4): 227-245.
33. Gajewska D., Niegowska J. & Kucharska A.: Compliance to DASH Diet by Patients with Essential Hypertension; *Polish Journal of Food and Nutrition Sciences. 2010;* 60(1):71-76.
34. Achieng L., Joshi M., Ogola E. & Karari E.: Adequacy of Blood Pressure Control and Level of Adherence with Anti-hypertensive Therapy; *East African Medical Journal. 2009;* 86 (11):6-73.
35. Busari O., Olanrewaju T., Desalu O., Opadijo O., Jimoh A., Agboola S. et al.: Impact of Patients' Knowledge, Attitude and Practices on Hypertension on Compliance with Antihypertensive Drugs in a Resource poor Setting; *TAF Prev Med Bull. 2010;* 9 (2): 87-96.
36. Mersal F. & Mersal N.: Effect of Evidence Based Lifestyle Guidelines on Self-Efficacy of Patients with Hypertension; *Int.J. Curr. Microbiol. App. Sci. 2015*; 4(3): 244-63.
37. Al-Wehedy A., Abd El-Hameed SH. & Abd El-Hameed D.: Effect of Lifestyle Intervention Program on Controlling Hypertension among Older Adults; *Journal of Education and Practice. 2014;* 5(5): 61-71.
1- Yang B., Sun Y. & Lin Y.: Health Education about Hypertension in the Elderly in Rural Chinese Villages. Human Health and Biomedical Engineering International Conference; Available at; ieeexplore.ieee.org/ iel5/ 6019104/.../ 06028956.pdf? 2011; accessed at 10 feb. 2015, 9 pm.
38. Esmaili Zabihi R., Ashktorab T., Banaderakhshan H. & Zaeri F.: Adherence to Therapeutic Regimens in Patients with Hypertension; *ARYA Atherosclerosis Journal. 2012;* 8:190-94.
39. Zeid W., Makledy F., Ismail M. & El Gammal H.: Effect of Family-Oriented Health Education Program on Awareness, Adherence to Treatment and Control among Hypertensive Patients; *Suez Canal university medical journal. 2014;* 17(1): 29-38.
40. Hadi N. & Rostami-Gooran N.: Determinant Factors of Medication Compliance in Hypertensive Patients of Shiraz, Iran; *Archives of Iranian Medicine. 2007;* 7(4): 292-96.
41. Ingram R.: Adherence to Antihypertensive Regimens in African Americans Ages 50 and Older. Published thesis; Degree Doctor of Philosophy, Faculty of the Graduate School at the University of North Carolina at Greensboro, 2010; 3-139.
42. Gatti M., Jacobson K., Gazmararian J., Schmotze B. & Krapalani S.: Relationships between Beliefs about Medications and Adherence; *American Journal of Health System Pharmacy. 2009;* 66: 657-64.
43. Al–Banna H. & Mohmed L.: Compliance and Knowledge of Hypertensive Patients Attending Shorsh Hospital in Kirkuk Governorate; the Iraqi Postgraduate Medical Journal. 2010; 9 (2): 1-6.

44. Salem M. & Hassan H.: Factors Associated with Noncompliance of Patient Taking Antihypertensive Medication; ASNJ. 2007; 6 (1): 21-35.
45. Al-Jbour B., Abu Kamel A., Barhoom H.: Knowledge about Hypertension and Antihypertensive Medication Compliance in a Jordanian Community Sample; *Journal of Education and Practice. 2013*; 4 (24):81-87.
46. Zhang X., Zhu M., Dib H., Hu J., Tang S., Zhong T. & Ming X.: Knowledge, Awareness, Behavior (KAB) and Control of Hypertension among Urban Elderly in Western China; *International Journal of Cardiology. 2009;* 137: 9-15.
47. Ulig J. & Leppée M.: From Morisky to Hill-Bone; Self-Reports Scales Josip for Measuring Adherence to Medication; *Coll. Antropol. 2014.;* 38(1): 55–62
48. Saleem F., Hassali M., Shafie A., Awad A., & Bashir S.: Association between Knowledge and Drug Adherence in Patients with Hypertension in Quetta, Pakistan; *Tropical Journal of Pharmaceutical Research. 2011;* 10 (2): 125-32.
49. Guirado E., Ribera E., Huergo V. & Borras J.: Knowledge and Adherence to Antihypertensive Therapy in Primary Care: Results of a Randomized Trial; *Gac Sanit. 2011;* 25(1):62-7.
50. Ambaw A., Alemie G., Yohannes S. & Mengesha Z.: Adherence to Antihypertensive Treatment and Associated Factors among Patients on Follow up at University of Gondar Hospital, Northwest Ethiopia; *BMC Public Health*. 2012; 12(282): 2 - 6.
51. Alwey S.: Assessment of Patients' Compliance with Essential Hypertension; *Sci. J. Nursing. 2008*; 21(2): 1-10.
52. Mweene M., Andrews B., Banda J., Mweene M. & Lakhi S.: Factors Associated With Poor Medication Adherence In Hypertensive Patients In Lusaka, Zambia; *Medical Journal of Zambia. 2010;* 37 (3): 252- 261.