Factors Affecting Compliance of Hypertensive Patients toward Therapeutic Regimen

Fatma Mostafa Mahrous

Medical-Surgical Nursing Department, Faculty of Nursing, Ain Shams University, Egypt
dr.fatma_mostafa@yahoo.com

Abstract: Hypertension is one of the most important cardiovascular risk factor but its control is still a challenge all around the world. Control of blood pressure can reduce cardiovascular morbidity and mortality, so the compliance to antihypertensive drugs and life style modification play an important role for the control of hypertension. **This study was aimed to** assess factors affecting treatment compliance with antihypertensive therapy guided by the use of Health Belief Model variables among hypertensive patients. **The study was conducted at** the Cardiology outpatients' clinic at Ain Shams University Hospital. **Collecting data from** simple random sampling a total of 135 hypertensive patients who are using antihypertensive treatment that attended the Cardiology outpatients' clinic at Ain Shams University Hospital. **The results of this study** illustrated that the hypertensive patients participated in this study showed low compliance to antihypertensive treatment, the most significant factors with demographic characteristic was sex (female being compliant) and with the guide of Health Belief Model (HBM) the strongest predictor was perceived barrier to antihypertensive treatment, and there was statistically significant relation between over all patients compliance & their information about therapeutic regimen including: side effect of drugs & how to deal with it, health diet, possible complication. **The study recommended that** the nurses should give heath education to patients to every clinic visit about the therapeutic regimen including medications, diet, exercise and activity, early warning signs, self-care and precipitating factors that should be avoided. Also, follow-up for the patients' compliance with therapeutic regimen by a community health nurse should be done periodically.
[Fatma Mostafa Mahrous. **Factors Affecting Compliance of Hypertensive Patients toward Therapeutic Regimen.** *Life Sci J* 2015;12(10):62-69]. (ISSN:1097-8135). http://www.lifesciencesite.com. 7

Keywords: Factors affecting**,** compliance, Hypertensive Patients therapeutic regimen.

1. Introduction:

Hypertension is an important public-health challenge worldwide. Prevention, detection, treatment, and control of this condition should receive high priority. Hypertension is defined as an average systolic blood pressure 140 mm Hg or greater, diastolic blood pressure 90 mm Hg or greater **(Kearney et al, 2005; Miller et al, 2009).** Hypertension is an important worldwide public-health challenge because of its high frequency and risks factor for cerebrovascular, cardiovascular and kidney disease **(Wolz et al, 2000).** The **World Health Organization (WHO)** has estimated that about 62% of cerebrovascular disease and 49% of ischemic heart disease burden worldwide are attributable to suboptimal blood pressure levels where by high blood pressure is estimated to cause 7.1 million deaths annually, accounting for 13% of all deaths globally **(WHO, 2006).**

Global burden of hypertension by Kearney et al, 2005 projected that the number of adults with hypertension will increase by 60% to a total of 1·56 billion (1·54 billion–1·58 billion) in 2025. Most of this rise can be attributed to an expected increase in the number of people with hypertension in economically developing regions, where by between 2000 and 2025, the worldwide prevalence of hypertension was predicted to increase by 9% in men and 13% in women because of projected changes in the age distribution of the population. Specifically, a larger proportion of the world population is expected to be older by 2025.

Risk factors for hypertension such as a sedentary lifestyle, obesity, consumption of fatty foods and resultant dyslipidemia are highly prevalent in the population and these factors contribute to the epidemic **(Bovet et al, 2008; WHO, 2003).**

Uncontrolled hypertension is caused by non adherence to the antihypertensive drugs, patients understanding their drug regimens help to improve their adherence, thus will help prevent the complications of hypertension which are debilitating and if not prevented can increase the burden of a disease that is already on the increase **(Kumar & Halesh, 2010).**

Non-adherence to prescribed drugs schedule has been and continues to be a major problem the world over. Studies on this subject show that adherence is about 50% for medications in chronic diseases including hypertension and much lower for lifestyle prescriptions **(Blanca et al, 2001).**

Poor adherence to long-term therapies severely compromises the effectiveness of treatment making this a critical issue in population health both from the perspective of quality of life and of health economics. Interventions aimed at improving adherence would

provide a significant positive return on investment through primary prevention (of risk factors) and secondary prevention of adverse health outcomes **(WHO, 2003).**

Adopting lifestyle modifications or non-compliance with prescribed medications can also be associated with uncontrolled hypertension as well as the risks of developing complications **(Campbell et al, 2006).** Compliance with antihypertensive drug therapy (AHT) has been shown to reduce the risk of stroke and coronary heart disease by an estimate of 34% and 21%, respectively, **(Law et al, 2003).** However studies revealed that medication therapy improves life expectancy and quality of life. Several studies have shown that patients with chronic conditions such as hypertension adhere only to 50-60 percent of medications as prescribed. **(Benner et al, 2002).**

The Health Believe Modal (HBM) is an approach that is used to describe social behavior as well as individual's cognition. It was introduced in 1950s by Social psychologists so as to facilitate in reasoning individuals participation in health programmes such as health check up and immunization. The HBM was also widely used to explain a range of health behavior. The Model also bases on studying compliances with lifestyle modification and antihypertensive medication. It also bases on understanding that high blood pressure involves both drug treatment and lifestyle changes **(Fisher, 1978).**

In this study the behavior examined is compliance with prescribed antihypertensive medication and lifestyle modifications. It is based on understand that high blood pressure control involve drugs and lifestyle modification. Compliance behavior is a complex and multidimensional phenomenon and various possible factors that influence the behavior **(WHO, 2003).** The factors include Scio-demographic, psychosocial, structural factors. Other factors that influence compliance behavior are cues to action and a sense of self efficacy **(Winfield & Whaley, 2002).**

Significance of the Study

This study has been conducted to assess compliance of patients with hypertension with therapeutic regimen, and the factors affecting their compliance. It is essential for such a group of patients to comply with the prescribed regimen to prevent complications and to save their life.

From the clinical experience and observation for the actual situation, it is obvious that patients with hypertension not comply to therapeutic regimen; drug regimen, prescribed diet, performance of suitable physical exercise, follow up precautions to avoid complications, they always readmitted to hospital with complications such as recurrent myocardial infarction (MI), cereberovascular stroke, drugs side effect, social and psychological problems or sudden cardiac arrest.

On other hand, patients with hypertension are suffering from difficulties to be compliant that contribute to diminish quality of life, increase morbidity and mortality. Because the compliance is a complex behavioral process that is strongly influenced by the environments in which patients live, the patient's social and cultural background, healthcare providers and healthcare system. The nurses are in a unique position therefore, one of the important duties of them to assess factors that influence patients' compliance and to develop interventions that will enhance their adherence to the prescribed regimen taking into consideration those factors.

2. Methodology:

Aim of the study:

The present study was aimed to:

1. Assess compliance of patients with Hypertension.

2. Assess the factors affecting compliance to therapeutic regimen guided by the use of Health Belief Model among patients with Hypertension.

- **Research questions:**

1. To what extent is the patient with Hypertension compliant with therapeutic regimen?

2. What are the factors affecting compliance among patients with Hypertension?

Technical Design:

1- Research design:

A quasi-experimental study was utilized to meet the aim of this study.

2- Settings:

The study was conducted in the Outpatient Clinics of Cardiology at Ain Shams University Hospital.

3- Subject:

Simple random sampling a total of 135 hypertensive patients who are using antihypertensive treatment that attended the Cardiology outpatients' clinic at Ain Shams University Hospital, from both genders who were admitted in the previously mentioned setting within three months duration from June to August(2014) were recruited in the study.

The inclusion criteria:

1) Patients of age 18 years and above,

2) Participants with a diagnosis of hypertension for at least one month with or without other co-existing medical conditions.

3) Participants who have been taking antihypertensive treatment for at least past one month ago.

4) Patients who agreed and consented to participate in the study

Exclusion criteria:

1) Patients who had not started antihypertensive
2) Patients less than 18 years of age
3) Patients who could not respond ex. too sick to be interviewed
4) Patients on antihypertensive medication who could not consent to participate in the study.
5) Patients who refused to participate in the study

4- Tools:

An interview questionnaire sheet consists of two parts:

First part:

This part was developed by the researcher, based on review of recent literature **(Burns & Grove 2007)** and concerned with socio-demographic characteristics of patients under study & factors affecting their compliance. The theoretical framework of the study using Health belief model.

Socio-demographic data that include patient's age, gender, occupation, marital status and level of education. Also, it includes past and present history of disease and health education.

- Physical factors had 3 items (presence of physical problems, use of visual aids and hearing devices, answer was Yes/ No).

Social factors had 4 items (effect of disease on work, home, family and family support, answer was Yes/ No).

- Psychological factors had 5 items (presence of insomnia, feeling of crying, shame on front of others, feel low self esteem, anxiety and depression, answer was never/ rarely /sometimes/ often! always).

- Patients' believes had 6 items (difficulties to be compliant, compliance leads to dependence on others, restrict and change life style, disease affects physical and psychological status, trust In medical information, effect of relation between patient and physician & family, and presence of problems in follow-up, answer was Yes/ No).

The second part:

The second part is concerned with patients' compliance about therapeutic regimen. This part is quoted from (**Mohamed, H. M. 2003 and Bloom, 2001)** and modified by the researcher, which includes: **Medication regimen compliance** was composed of 8 items, asking how often you forget to take your medicine. The responses were measured on a 4-point Likert scale: (1) Every day (2) frequently, (3) rarely or (4) never. For life style compliance was having 5 items, participants were asked to respond to the single question based on a 4 point Likert scale: how often do desirable or undesirable behaviors related to control of hypertension. The responses were: (1) Every day,(2) frequently, (3) rarely or (4) never. Some questions were set such that the highest score did not reflect the worst scenario of none-compliance. To resolve these scores were reversed. Example, how often do you engage in physical exercise (4) Every day, (3) frequently, (2) rarely or (1) never.

The 13 items measuring treatment compliance and life style compliance were added up to get sum index with a distribution ranging from 34 to 51with mean 43.76 (SD =3.672), the median split was used (44.4), which was dichotomized into two groups i.e. 1 = those who are non treatment compliant and 2 = treatment compliant which was 34-43 and 44-51 The HBM variables were measured as described below. Perceived severity of having hypertension, perceived susceptibility of being at risk of hypertension complications and perceived benefit were each measured by six items. The reminders (cues to action) were measuring by seven items. Participants were then asked to respond: (1) strongly agree, (2) agree, (3) disagree or (4) strongly disagree.

Six items measuring perceived severity were added up to get sum index with a distribution ranging from 7 to 24 with mean 20.10(SD =2.85), the median split 50.4 was used as a cut point. Dichotomization was done into two frequency groups, those who had low perceived severity and those who had high perceived severity. Six items measuring perceived susceptibility were added up to get sum index ranging from 6 to 19 with mean of 10.79 (SD =2.83), the median split was 49.6. The sum index for perceived susceptibility was dichotomized into 1=, those with low perceived susceptibility and 2= those with high perceived susceptibility.

Six items measuring perceived benefit were added up to get sum index with a distribution ranging from 12 to 24 with mean (SD) 20.24(2.87) median split 51.1, then dichotomized into, those with low perceived benefit and those with high perceived benefit. Seven items measuring cues to action were added up to get sum index with a distribution ranging from 15 to 28 with mean (SD) 24.27(2.65) median split 42.2, then dichotomized into two frequency groups those with low perceived cues to action and those with high cues to action.

Five items measuring perceived barriers were added up to get sum index with a distribution ranging from 5 to 15 with mean (SD) 8.36 (2.48), median split 54.8, then dichotomized into, those with low perceived barrier and those with high perceived barrier. The aspects that might hinder respondents to comply with their treatment included not having enough time to do exercise. Responses were (1) strongly not a problem (2) not a problem (3) problem and (4) strongly a problem.

11. Operational Design:

1. Preparatory phase:

It included reviewing of literature & theoretical knowledge of the various aspects of this issue in order to develop the data collection tool.

***2.* Pilot study:**

A pilot study was conducted on 10 patients for testing clarity, relevance, and feasibility of conducting and estimate the time required for interview. Based on the result of pilot study, the necessary modifications and clarifications of some questions were done to have more applicable tools for data collection. Those patients were excluded from the study sample.

***3.* Content validity:**

It was established by a panel of 10 experts who reviewed the tool for clarity, relevance, comprehensiveness, understanding, and its applicability.

***4.* Field work:**

A total of 135 hypertensive patients who agreed to participate in the study in the period from June to August (2014) were included in the study. The aim of the study & component of the tool were explained to patients at the beginning of data collection. They were assured that the information collected would be treated confidentially & that it would be used only for the purpose of the study.

The researcher visited the outpatient clinic in afternoon shift from 1:00 pm to 3.00 pm for one day weekly i.e., Sunday in the period from June to August (2014). Afternoon shift was suitable for the researcher because it was easy to find the patients in the outpatient' clinic for follow-up. Each patient was interviewed individually by the researcher at a suitable place in outpatient's clinics of cardiology. Eleven patients are taken in each visit. The interview questionnaire sheet took from 10-20 min for each patient.

I. Administrative Design:

To carry out the study, the necessary approval was obtained from the hospital director of Outpatient Clinics of Cardiology at Ain Shams University Hospital. Official letters were issued to them from the faculty of nursing explaining the aim of the study to obtain permission for the collection of data. An oral consent was taken from patients for permission to participate in research process.

II. Statistical Design:

The collected data were organized, categorized, tabulated and analyzed. Data were presented in tables and charts using actual numbers and percentage in tables. The statistical significance and association were assessed using chi square test (X2) and T- test.

III. The observed differences, associations were considered as follows:

IV. $P > 0.05$ Not significant (NS)

V. $P < 0.05$ Significant (S)*

VI. $P < 0.001$ High significant (HS)**

III. Ethical consideration:

Ethical research in this study includes the following:

1. The research approval obtained from the ethical committee before starting the study.
2. The researcher clarified the objective and the aim of the study to the patients.
3. The researcher assured maintaining anonymity and confidentiality of the subjects` data.
4. The patients informed that they are allowed to choose to participate or not in the study and withdraw at any time.

Limitations of the study:

There were some subjects who left the study because they refuse to continue questionnaire or due to traveling, those subjects were replaced by other subjects.

3. Result:

The results are shown in the following tables (Tables 1-5).

Table 1: Socio-demographic characteristics of respondents N=135

Characteristics	Frequency	Percentage
Age (years)		
≤ 64	88	65.2
≥ 65	47	34.8
Sex		
Male	59	43.7
Female	79	56.3
Marital status		
Married	82	60.7
Separate	25	18.5
Widower	28	20.7
Level of education		
No formal education	45	33.3
Primary education	74	54.8
Secondary education	16	11.9
Occupation		
Employed	60	44.4
Unemployed	75	55.6

Table 2: Distribution of participant's demographic factors by treatment compliance

Characteristics	Treatment Compliance				P-value
	Non Compliance n=60		Compliance n=75		
	No	(%)	No	(%)	
Age (years)					
≤ 64	38	43.2	50	56.8	0.686
≥ 65	22	46.8	25	53.2	
Sex					
Male	32	54.2	27	45.8	0.044
Female	28	36.8	48	63.2	
Marital status					
Married	32	39.0	50	61.0	0.287
Separate	13	52.0	12	48.0	
Widower	15	53.6	13	46.4	
Level of education					
No formal education	20	44.4	25	55.6	0.277
Primary education	30	40.5	44	59.5	
Secondary education	10	62.5	6	37.5	
Occupation					
Employed	27	44.0	33	56.0	0.908
Unemployed	33	45.0	42	55.0	

Table 3: Distribution of participant's treatment compliance by HBM variables

Characteristics	Treatment Compliance				P-value
	Non Compliance n=60		Compliance n=75		
	No	(%)	No	(%)	
Severity					
Low	29	42.6	39	57.4	0.672
High	31	46.3	36	53.7	
Susceptibility					
Low	37	55.2	30	44.8	0.012
High	23	33.8	45	66.2	
Benefit					
Low	38	55.1	31	44.9	0.011
High	22	33.3	44	66.7	
Barrier					
Low	17	23.0	57	77.0	0.000
High	43	70.5	18	29.5	
Cues to action					
Low	34	59.6	23	40.4	0.002
High	26	23.3	52	66.7	

Table 4: Distribution of participants by reason of not complying with medication

Item	Treatment compliance N=135							
	Daily		Frequently		Rarely		Never	
	No	(%)	No	(%)	No	(%)	No	(%)
Forgetting	---	---	16	11.9	54	40.0	65	48.1
Stop medicine when feeling well	1	0.7	31	23.0	39	28.9	64	47.4
Stop medicine when feeling bad	---	---	5	3.7	14	10.4	116	85.9
Believe that they are ineffective	---	---	5	3.7	1	0.7	129	95.6
Fear side effects	2	1.5	29	21.5	18	13.3	87	63.7
Avoid addiction	1	0.7	22	16.3	19	14.1	93	68.9
Using traditional medicine	---	---	13	9.6	27	20.0	95	70.0
Stop medicine because of expenses	---	---	65	48.1	29	21.5	41	30.4

Table 5: Pearson correlation between HBM variables

Variables	1	2	3	4	5	6
1. Treatment compliance	-	0.104	0.141	0.274**	-0.528**	0.197*
2. Perceived severity		-	0.285**	0.090	-0.090	0.202*
3. Perceived susceptibility			-	-0.062	-0.061	-0.180*
4. Perceived benefit				-	-0.449**	0.323**
5. Perceived barrier					-	0.323**
6. Cues to action						-

-*: P ≤ 0.05; **: P ≤ 0.01

4. Discussion:

This study explored factors affecting treatment compliance among hypertensive patients attended hypertension clinics at the Cardiology outpatients' clinic at Ain Shams University Hospital. The data obtained through self- reporting using questionnaires on compliance to medication regimen and lifestyle modification revealed the proportional of treatment compliance was 53.3%, the result is similar to study done by Karachi by **Nasir et al, 2008** found that 54% of hypertensive patients were having good drug compliance and was also similar to study done by **Almas et al, 2006** which showed that 57% of hypertensive patients were compliant to antihypertensive therapy, while the study done by **Nasir and others** showed that 48.3% of hypertensive patients were complaints to antihypertensive drugs and 51.7% were not compliant to the drugs.

In this study the mean age (SD) of all included hypertensive patients was 56.3 (±13.1) years; this is not surprising since hypertension is more common in older people. **Nasir and colleagues in 2008** have done a study on compliance to antihypertensive drugs, salt restriction, exercise and control of systemic hypertension in hypertensive patients found that, mean age of 55.8±13.4 years of hypertensive patients and study done by **Almas et al, 2006** on factors affecting the compliance to antihypertensive therapy, found the mean age of 58.1 (±12) years of hypertensive patents.

The current study shows that, participants who were 64 and below years of age had higher level of treatment compliance compared to those with 65 and above years of age. These results are comparable to those reported from the study done **by Krousel-Wood et al, 2009.** The possible explanation of these results might be the truth that, the young people have higher income since they are able to work and thus can afford to buy medication compared to older people. Another possible reason is that older people might have more than one disease due to aging reason, which might have led them using many drugs which make them tired, hence, stop taking drugs.

Cognitive and functional impairment in elderly patients increases their risk of poor drug compliance, so they need a family to remind, support and assist them in taking drugs **(WHO, 2003).**

In this study female were more compliant (63.2%) compared with male (45.8%) it was statistical significance (P 0.044). Female patients have found by some researchers to be better compliance to treatment **(Jing et al 2009; Fodor et al 2005)** support the above point that female were more complicate than male. Impotence is the likely hood side effect which affects men on hypertensive medications; this might be the reason why male had low level of treatment compliance compared to female.

The finding showed that patients without formal education level (55.6%) had high treatment compliance compared to those with high education level (37.5%). **In UK,** a study done by **Senior et al 2004** found that patients without formal education qualifications had better compliance with medication. This may be due to the reason that patients with lower educational level might have more trust in physicians' advice compared to those with higher level of education. From these results, it seems that educational level may not be a good predictor of treatment compliance. In contrary to several studies found that patients with higher educational level might have higher compliance **(Okuno et al, 2001; Ghods & Nasrollahzadeh, 2003; Yaruz et al 2004)** while other studies found no association **(Stilley et al 2004; Wai et al 2005).**

The relationship between marital status and treatment compliance was observed, married participants were more compliant with treatment (61.0%) than non married participants, and this result was comparable with result of study done by **Cooper et al 2005,** marital status might influence patients compliance with medication positively, the help and support from a spouse could be the reason why married patients were more compliant to treatment than single patients.

Distribution of participants by reasons of not complying with antihypertensive medication were determined, the reasons were stopping medication due to; cost of the medications, feeling well (asymptomatic), fear of the side effect, avoiding addiction of drugs and use of traditional medicine. Study done **by Almas et al, 2006; Hashim et al 2007;** support the point above.

From this study the relationship between HBM constructs and treatment compliance was observed; the constructs which were significantly showing relationship were perceived susceptibility of being at risk of getting hypertension complications, perceived benefit of using medicine, perceived barrier to treatment and cues to action. The perceived severity to hypertension did not show significant relationship with treatment compliance. Importantly, the present result corresponds closely to those of a previous study done **by (Rosenstock, 1974)** which revealed perceived barrier was important predictor in non compliance to antihypertensive drugs.

Uncontrolled hypertension is caused by non adherence to the antihypertensive drugs; Poor adherence compromises the effectiveness of treatment making this a critical issue in population health both from the perspective of quality of life and of health economics **(WHO, 2011).** The complications of uncontrolled hypertension are cerebrovascular, cardiovascular and kidney disease **(Wolz et al, 2000).**

When those complications arise patients end up in ICU leading to increased work load to both critical care nurses and doctors. Those patients in critical condition especially with myocardial infarction or stroke stay longer in ICU causing increased cost of hospitalization. This has a poor outcome to their quality of life as it may cause permanent disability or death which increasing the burden to their family, community and nation as a whole.

Patients understanding their drug regimens help to improve compliance to treatment thereby preventing complications of hypertension and the debilitating outcomes (**Kumar & Halesh, 2010).**

References

1. Almas, A., Hameed, A., Ahmed, B., & Islam, M. (2006): Compliance to antihypertensive therapy, *JCPSP, 16*, 23-26.
2. Benner, J., Glynn, R., Mogun, H., Neumann, P., Weinstein, M., & Avorn, J. (2002): Long-term persistence in use of statin therapy in elderly patients, *Jama, 288* (4), 455-61.
3. Blanca, R., Blanca, R., & Ernesto, F. (2001): Pharmacological therapy compliance in diabetes, 233-236.
4. Bloom, B. S. (2001): Daily regimen and compliance with treatment, *British Medical Journal, 323*, 647 - 648.
5. Bovet, P., Gervasoni, J., Mkamba, M., & Balampama, M. (2008): Low utilization of health care services following screening for hypertension in Dar es Salaam (Tanzania): A prospective population - based study. *BMC Public health, 407* (8), 1471-2458.
6. Burns, N., & Grove, S. K. (2007): *The practice of nursing research: conduct, critique & utilisation;* (5TH ed.). Philadelphia: W.B. Saunders.
7. Campbell, N. R., Petrella, R., & Kaczorowski, J. (2006): Public education on hypertension: a new initiative to improve the prevention, treatment and control of hypertension in Canada, *Canadian Journal of Cardiology, 22* (7), 599-603.
8. Fisher, A. A. (1978): The Health Belief Model and Contraceptive Behaviour: Limits to the Application of Conceptual Framework, Health Education Monographs. *5*, 244-8.
9. Fodor, G. J., Kotrec, M., Bacskai, K., Dorner, T., Lietava, J., Sonkodi, S., et al. (2005):Is interview a reliable method to verify the compliance with antihypertensive therapy? An international central-European study, *Journal of Hypertension, 23* (6), 1261-1266.
10. Ghods, A, J., & Nasrollahzadeh, D. (2003): Non compliance with immunosuppressive medications after renal transplantation. Exp Clin Transplant, 1,39–47.
11. Hashmi, S. K., Afridi, M., Abbas, K., Sajwani, R. A., Saleheen, D., philippe, M., et al. (2007): Factors Associated with Adherence to Anti-Hypertensive Treatment in Pakistan, *PLoS ONE, 2* (3), e280.
12. Jing, J., Grant, E. S., Vernon, M. S., & Shu, C. (2009): Factors affecting therapeutic compliance: A review from the patient's perspective. *4* (1), 269-286.
13. Kearney, P., Whelton, M., Reynolds, K. M., Whelton, P., & et, al. (2005): Global burden of hypertension: analysis of worldwide data, *Lancet, 365*, 217–23.
14. Kumar, P., & Halesh, L. H. (2010): Antihypertensive treatment: a study on correlates of non adherence in a tertiary care facility. *1* (4), 248-252.
15. Krousel-Wood, M., Thomas, S., & Muntner, P. (2009): Medication adherence: A key factor in achieving blood pressure control and good clinical outcomes in hypertensive patients, *Curr Opin Cardiol PubMed., 19*, 357–362.
16. Law, M., Wald, N., & Morris, J. (2003): Lowering blood pressure to prevent myocardial infarction and stroke: a new preventive strategy, *Health Technol Assess, 7*, 1-94. 42.
17. Miller, H., Berra, K., & Long, J. (2009): Awareness, understanding, and treatment of previously diagnosed hypertension in baby boomers and seniors: a survey conducted by harris interactive on behalf of the preventive cardiovascular Nurses association. *12* (5), 328-334.

18. Mohamed, H.M. (2003): Assessment of Tuberculosis patient Compliance and Chest Hospital Nurses Knowledge and Practice. Unpublished Master Thesis in Nursing Science. Faculty of Nursing. Ain Shams University.
19. Nasir, A., Muhammad,A., Syed, H. S., & Waqas, A. (2008): Compliance to antihypertensive drugs, Salt restriction, Exercise and Control of systemic hypertension in hypertensive patients at Abbottabad. Ayub med, 20(2) 66-68.
20. Okuno, J., Yanagi, H., & Tomura, S. (2001): Is cognitive impairment a risk factor for poor compliance among Japanese elderly in the community? Eur J Clin Pharmacol.57,589–94. 43
21. Rosenstock, I. M. (1974): The Health Belief Model and Health Preventive Behaviour, Health Education Monographs. *2*, 354-86.
22. Stilley, C,S., Sereika, S., Muldoon, M,F., et al. (2004): Psychological and cognitive function: predictors of adherence with cholesterol lowering treatment. Ann Behav Med, 27,117–24.
23. Wai, C,T., Wong, M,L., Ng, S, et al. (2005): Utility of the Health Belief Model in predicting compliance of screening in patients with chronic hepatitis B. Aliment Pharmacol Ther, 21,1255–62.
24. WHO. (2003): Adherence to long-term therapies: evidence for action Geneva.
25. WHO. (2006): International Society of Hypertension. Guidelines for the mangement of hypertension-part II. *Cardiology today, 6*, 146-1647.
26. WHO. (2011): World Health Rankings, live longer live better, Tanzania: Stroke (2011).
27. Winfield, E. B., & Whaley, A. L. (2002): A comprehensive test of the health belief model in the prediction of condom use among African American college students. *Journal of Black Psychology, 28* (4), 330-346. 45 Yavuz, A., Tuncer, M., Erdogan, O., et al. (2004): Is there any effect of compliance on clinical parameters of renal transplant recipients? Transplant Proc, 36.120–1.
28. Wolz, M., Cutler, J., Roccella, E., Rohde, F., Thom, T., & Burt, V. (2000): Statement from the National High Blood Pressure Education Program: prevalence of hypertension. *Am J Hypertens, 13*, 103-104.

10/2/2015