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Study of In-Patient Compliance in CPEIC Hospital Regarding CVS Disorders

Abstract

To assess the knowledge of patient regarding the use of medications and to evaluate patient compliance, and the study was conducted in Chaudhary Pervaiz Elahi Institute of Cardiology, Multan, Pakistan. According to analysis, 81% of patients were from urban areas, and 19% of patients were from rural areas. 30% of them were literate, and 70% were illiterate. Most of the patients belonged to the age group of 40-50yars (71%). The majority of the affected persons were male, i.e.70%. The most commonly observed disease were IHD and hypertension, i.e.26% and 24.5%, respectively. 36% of the patients had a history of CVS disorders in their families. The influence of lifestyle was analyzed with regard to smoking, drinking and lack of physical activities. There is a need for educational strategies for the patient to recognize the significance of compliance for this disease. Also, educational intervention is required for prescriber and hospital pharmacist to improve prescribing and dispensing.

Key Words: Coronary Artery Disease, Risk Factors, Prevalence, Men, Women

Introduction

Many diseases and conditions, in particular, those that are asymptomatic, are easy to ignore even when they have been diagnosed, for example, patients with diabetes or hypertension. As the symptoms don't get in the way of everyday life, so it's easy for patients not to follow the prescribed treatment regimens. Non-compliance can, of course, have dire consequences.

In medicine, compliance (also adherence, concordance, or capacitance) describes the degree to which a patient accurately follows the advice of health care providers (Nosé M, Barbui C, Gray R, Tansella M 2003; Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, et al. 2005). Compliance is affected by the health care provider and patients, and a positive physician-patient relationship is the most important factor in improving compliance. Although the high cost of prescribed medication also plays a vital role. The major obstacle to the actual delivery of health care is non-compliance (Chobanian AV, Bakris GL, Black HR, et al. 2003; WHO)

According to a WHO report, only about 50% of patients living in developed countries with chronic diseases follow treatment recommendations.

In particular, low rates of adherence to therapies for diabetes, asthma and hypertension are thought to contribute markedly to the human and economic burden of those conditions. Compliance rates may be overestimated in the medical literature, as compliance is often high in the setting of a formal clinical trial but drops off in a "real-world" setting. Mitchell, Richard Sheppard; Kumar, Vinay; Abbas, Abul K.; Fausto, Nelson (2007).

Major barriers to compliance are thought to include the poor "health literacy", complexity of medication prescribed, and lack of understanding about benefits to following the treatment, side effects, the cost of therapy and poor communication. Efforts to improve compliance have been aimed at simplifying medication packaging, providing effective medication reminders, improving patient education and limiting

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the number of medications prescribed simultaneously.

Method

Study Design and Sample Recruitment

This analysis was questionnaire-based. The study was conducted during the time period of 9th March to 18th May 2013. 200 patients were selected randomly for the study from Chaudhary Pervaiz Elahi Institute of Cardiology, Multan, Pakistan.

The inclusion criteria were as follows;

1) Patients of age 20 years and above,
2) Those who had been diagnosed with 'essential' hypertension and other cardiovascular diseases
3) Those who were on prescribed anti-hypertensive medications since at least the previous one week. All people who fulfilled the inclusion criteria were then assessed for familiarity with Urdu. Hashmi SK, Afridi MB, Abbas K, Sajwani RA, Saleheen D, et al. (2007).

Patients who decided to participate were described as the objective and nature of the study, and informed consent was formally obtained.

Data Collection

The data collection tool was a questionnaire based on an extensive literature review of similar studies.[17, 18]. The questionnaire extracted information regarding patient demographics and clinical characteristics, including comorbidities such as ischemic heart disease and other characteristics of hypertension and anti-hypertensive treatment, awareness about hypertension and anti-hypertensive treatment, and factors that, in the patient's views, encouraged or discouraged the patient's drug-taking behavior. Blood pressure was measured twice. Chobanian AV, Bakris GL, Black HR, et al. (2003).
Patients were inquired regarding details of their prescribed drugs. All information was based on self-reporting and patient profile. The questionnaire basically consisted of three parts;

Introductory Part

From this part, we gathered a brief idea about the patient, i.e. his/her social status, educational level, demography (urban/rural), patient's duration of stay in the hospital, the ratio of male and female patients having cardiovascular problems and the age group of patients.

Diagnosis and Medication

In this portion, we considered the most common cardiovascular problems. Following are the list of cardiovascular problems that were most commonly observed in the patient.

- HTN;
- Prehypertension;
- Stage-1 hypertension
- Stage -2 hypertension
- Chest pain
- IHD (ischemic heart disease)
- ANGINA
- LB3 (left bundle branch)
- MI (myocardial infraction)
- HF (heart failure)
- Miscellaneous

From this, we get the ratio of occurrence of each disease in both (male/female) patients.

In the case of medication, we considered two aspects of therapy, monotherapy and combination therapy. We can also draw a rough estimate of the nature of the prescription, either the generic name or the brand name. The skill of writing a prescription could also be assessed in this manner. The patients' previous illness and drug allergy, and resistance can be checked from the previous medication, but it was not the main issue to be considered in this portion, the main purpose was to check the drug regimen and monitor the interaction and also know if the ADRs are managed or not.

Assessment of Patient Compliance toward his/her Disease

The starting of this portion was from the patient's lifestyle. The logic was that from the lifestyle, we could assess the possible reason for disease because, as we know, hypertension and other cardiovascular diseases occur due to a non-healthy living style. The questionnaire's format was based on simple questions that could be answered by every patient (educated/non-educated). The method used was the patients' interview. The medium used for each patient was his/her mother tongue so that we could get reasons for adherence and non-adherence. We focused on the following parameters;

Trust on the Doctor

The trust of the patient in the doctor is the key factor for therapy, and the patient's recovery greatly relies on it because if a patient is satisfied with his doctor, he will comply better, will follow the medication

keenly, will adhere to it thoroughly and will recover fast.

Patient's information regarding disease:
The patient's awareness regarding his/her disease is also a very important step toward the treatment. When a patient has knowledge about his/her disease, he can be more compliant because he can understand the importance of his disease and be aware that by being compliant, he'll be living a better life and can avoid hazards of the non-compliance.

Either clarify their doubts about disease or not
It is of sole importance that the patient clarifies his doubts about the disease because most of the times, the misconceptions of patients make them hesitant to follow the medication and cause side effects. Furthermore, they rely on quakes and Hakeem, which even worsen the condition. All this ignorance about the therapy is the major hindrance toward patient compliance.

Routine follows up of B.P:
Regular blood pressure monitoring makes the patient and his doctor able to get the knowledge of the patient's physiology and drug outcomes on his body, and this is important because, in this way, we can manage the disease properly.

Medication taking behavior:
Medication taking behavior of the patient is of vital importance because if a patient forgets to take medicine on time, then the therapeutic level and therapeutic action are not achieved. Furthermore, when the patient takes a double dose next time, then toxic effects may result. So care should be taken.

Use of reminders:
If the patient is serious about his/her disease, then he/she will use some sort of reminders to take medication on time and ultimately show compliance.

Difficulty in taking medication:
Some people have difficulty in taking medication, especially tablets, because they can't swallow them, and that's why they start to avoid medication. So the patient becomes non-compliant. The doctor must ask the patient if he/she has any problem relating to the intake of medication.

Discontinuation of medication on feeling better:
More often, it is observed that the patient stops medicine when he starts feeling better, but this results in a rebound attack of the disease symptoms and sometimes uncontrollable problems. So the doctor must advise the patient to be compliant.

Do you forget to take medication?
The doctor must ask the patient whether he/she forgets to take medicine and what is the reason behind it so that the problem can be solved at the initial step.

Reasons to Forget

- I cannot afford the cost of medication.
- Medication not easily available.
- I don't like medication.
- I only take them when I feel that I need them.
- I don't take it due to the side effects of the medication.
- I prefer alternative medication (herbal, homoeopathic)
- I just forgot.
- I don't know
- Others;

Expect Further Improvement
The doctor must consider that after taking medication, patient parameters have improved and whether there is any further chance of improvement. If so, then he should be taking steps to do so.

Routine Lab Test
Routine lab tests should be done to monitor the patient's condition and medication action. It helps the doctor to evaluate the therapy and he'll be able to carry on treatment more progressively.

Alerted by Medical Attendant
In this statement it is pointed out that if patient's medical attendant alerts him about his disease and precautions he should take to improve his disease condition and what should be avoided to regress disease symptoms.

Precautionary Measures Taken
Doctor must guide patient to take precautionary measures. In this way we can check patient's compliance. If the patient takes medicine but does not take precautions, then he'll not get many benefits out of it. So this must be considered.

Questionnaire for CVS Patients

To check patient compliance

Patient details

Name
Age
Sex
Weight
Height
Occupation
Education
Address

Diagnosis

- Which of the following disease is diagnosed:
- HTN;

Prehypertension;
Stage 1: hypertension
Stage 2: hypertension

- Chest pain
- IHD (ischemic heart disease)
- ANGINA
- LB3 (left bundle branch)
- MI (myocardial infraction)
- HF (heart failure)
- Miscellaneous
- Blood pressure reading at the moment of diagnosis.

Prehypertension [sys, 120-139/dia, 80-89]

Stage 1: hypertnsion [sys, 140-159/dia, 90-99]

Stage 2: hypertension [sys,>160mmHg&dia,≥100]

Other CVS problems;

History

- Do you have blood relatives with the history of hypertension;

Life Style

Do you smoke cigarette, cigars, pipe, and tobacco?

a. Yes
b. No

If yes how many per day;

- Do you perform exercise in routine life;
  a. Yes
  b. No
- Do you drink alcohol;
  a. Yes
  b. No

Questions to patient to check his/her compliance with therapy

1. Do you trust your doctor
2. Do you clarify your doubts about your therapy
3. Do you regularly go for routine follow up to check your blood pressure
4. Do you take your medication on time
5. Do you use reminders to take your medication at the correct time
6. Do you have any difficulty in taking medicines
7. when you feel better, do you sometimes stop taking your medication
8. If you don't take your medication regularly, why don't you take them as directed

- Cannot afford the cost of medication.
- Medication not easily available.
- I don't like medication.
- I don't take due to side effects of the medication.
- I prefer alternative medication (herbal, homeopathic)
- I just forget.
- I don't know

Others;

9. Do you perform lab tests routinely to monitor your cholesterol level.
10. Did your medical attendant alert you about your anti-hypertension drugs.
11. if you feel worse when you take your medication, do you sometimes stop taking it.
12. Are you taking any precautionary measure after diagnosis;
    a. Yes
    b. No

If yes, then what kind of it;

- Eat no salt or less than before.
- Get regular physical exercise.
- Eat more vegetables.
- Other.
- None.

Result and Discussion

In the cases of chronic or repeat conditions, patients will sometimes decide that a treatment didn't work in the past, so they are either reluctant or unwilling to try it again.

The major cause of non-compliance with hypertension medication in Ghana

Unaffordable prices for hypertension drugs were cited as the major reason for non-compliance in GHANA(Africa). The study was conducted with 500 patients(Third World Network). In which 33% of the hypertension patients being unemployed, this price is beyond affordability. The fact that 49% were manual workers who invariably are poorly remunerated in Ghana means that the majority of the patients had limited incomes. Doctors may wish to consider affordability as a clinical factor when prescribing. Since the majority of the patients were female in the 40-60 age group, it is likely that most of these were housewives and as is often the case in Africa, depend on their husbands for financial support. Thirty-three percent (33%) of the patients cited side effects as a reason for non-compliance. Most of the side effects were intolerable headaches and sexual dysfunction in men, which were attributed to treatment (Anand PM, Billmoria AR, ed,(1999).

Frequency Tables

Table1. Patient's Demography

	Frequency	Percent	Cumulative Percent
urban	162	81.0	81.0
rural	38	19.0	100.0
Total	200	100.0	

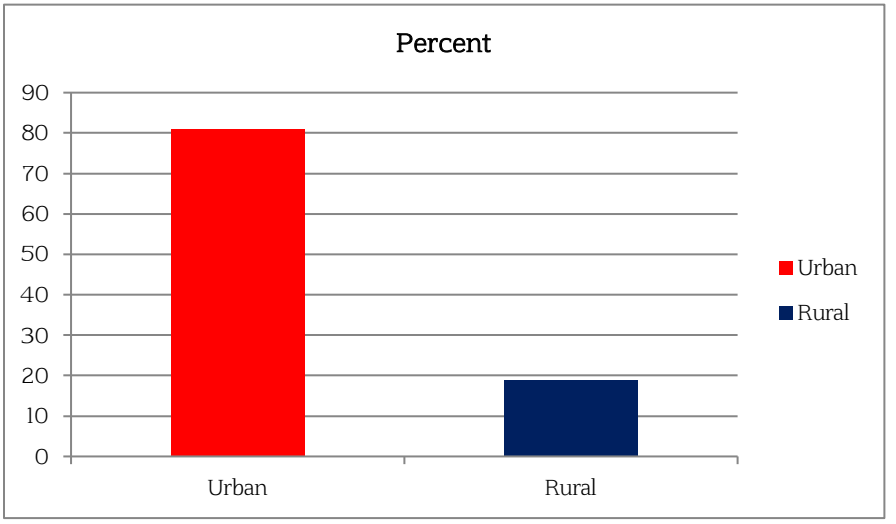

Figure 1: In this table, it is shown that most of the patients were from urban areas, which were 81%, and almost 19% were from a rural area.

Table 2. Patient's District

	Frequency	Percent	Cumulative Percent
Multan	163	81.5	81.5
Khanewal	10	5.0	86.5
Vehari	4	2.0	88.5
Layyah	5	2.5	91.0
Dera ghazi khan	4	2.0	93.0

Muzafar garh	7	3.5	96.5
others	7	3.5	100.0
Total	200	100.0	

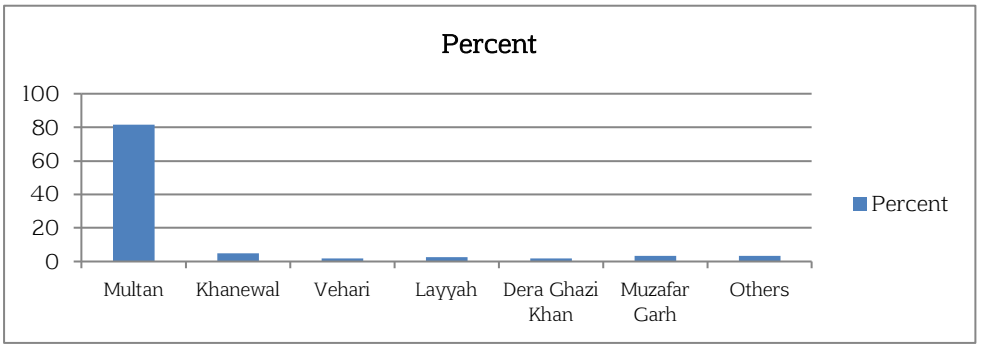

Figure 2:

Most of the patients in Chaudhary Pervaiz Elahi hospital were native of Multan city, which were almost 81.5%. Khanewal had the 2nd highest percentage of patients having cardiovascular diseases, i.e.5%. In Vehari, %age was 2%. Layyah had 2.5%. Dera ghazi khan had 2%. Muzaffargarh had 3.5%. Other cities had 3.5%. So by this ratio, we can find evidence of heart diseases in these areas.

Table 3. Patient's Educational Status

	Frequency	Percent	Cumulative Percent
literate	60	30.0	30.0
illiterate	140	70.0	100.0
Total	200	100.0	

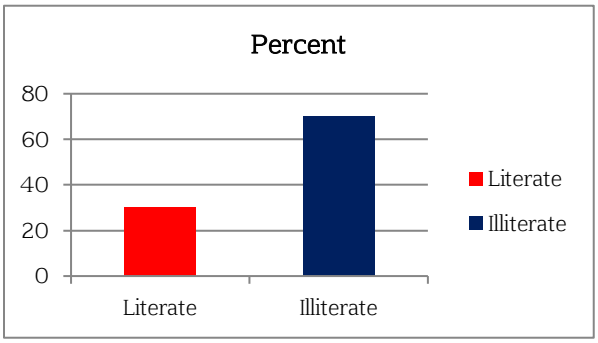

Figure 3.

Most of the patients were illiterate in the ward; almost 70% and 30% were educated. So the ratio of disease was greater among uneducated, and they had no knowledge of their disease, and they were brought here when disease aggravated because of their unawareness.

Table 4. Patient's Level of Education

	Frequency	Percent	Cumulative Percent
primary	141	70.5	100
middle	24	12.0	15.5
matric	19	9.5	25.0
inter	4	2.0	27.0
bachelors	5	2.5	29.5

master	7	3.5	70.5
Total	200	100.0	

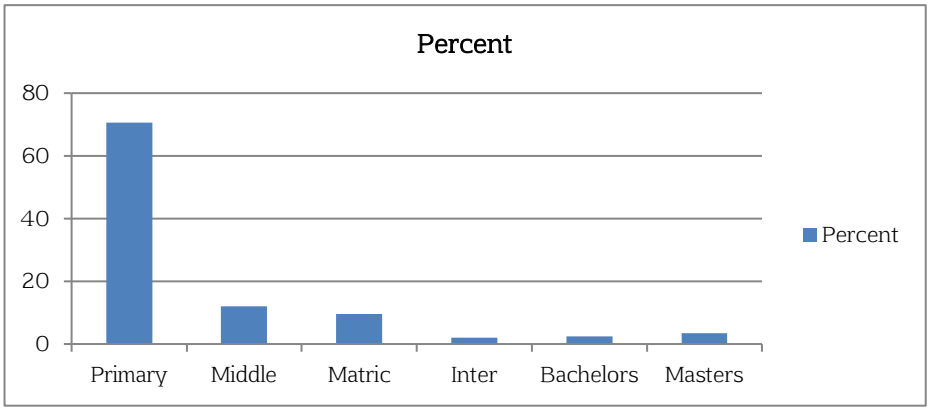

Figure 4:

The level of education among patients found was such that 70.5% were educated at primary level, 12% were at the middle level, 9.5% were educated at matric level, 2% were at an intermediate level, 2.5% were at bachelors' level, 3.5% were at masters level

Table 5. Patient's Age

	Frequency	Percent	Cumulative Percent
20-30	3	1.5	1.5
30-40	23	11.5	13.0
40-50	71	35.5	48.5
50-60	57	28.5	77.0
60-70	28	14.0	91.0
70-80	13	6.5	97.5
80-90	5	2.5	100.0
Total	200	100.0	

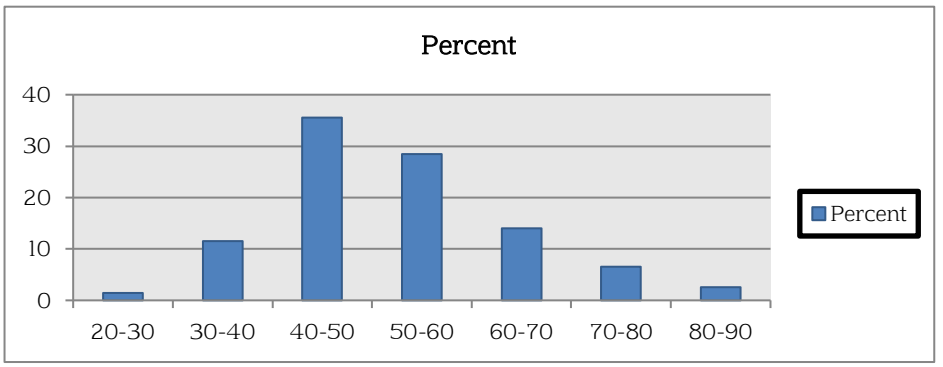

Figure 5:

71% of patients were in the age group of 40-50 years. 57% were in the age group of 50-60years. 28% of patients were in the range of 60-70years. 23% were within the age limit of 30-40years. 13% were between 70-80years. 5% were in the age limit of 80-90years, and 3% were in the age limit of 20-30%. From this data, we conclude that middle aged people are more prone to CVS diseases than elders and children.

Table 6. Patient's Gender

	Frequency	Percent	Cumulative Percent
Male	140	70.0	70.0
Female	60	30.0	100.0
Total	200	100.0	

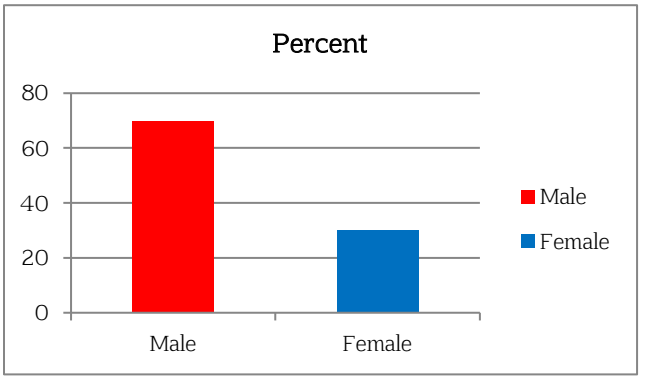

Figure 6.

The occurrence of CVS problems in males was 70%, and that in females was 30%. So males are more susceptible to CVS diseases.

Table 7. Patient's Occupation

	Frequency	Percent	Cumulative Percent
Labor	57	28.5	28.5
Farmer	53	26.5	55.0
Office work	28	14.0	69.0
housewife	55	27.5	96.5
Unemployed	7	3.5	100.0
Total	200	100.0	

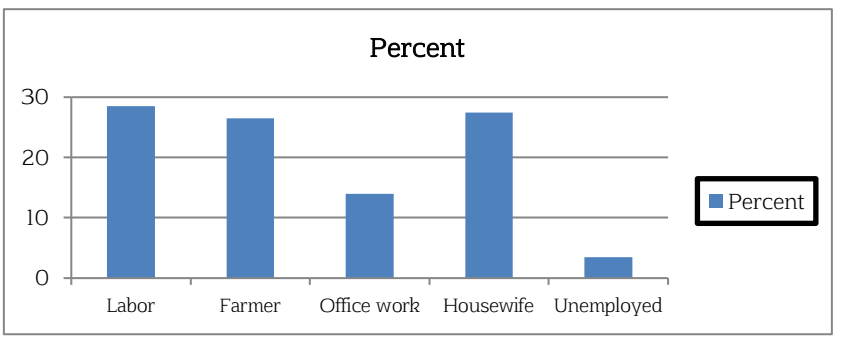

Figure 7.

The percentage of CVS diseases in laborers was 57%, in house wives was 55%, in farmers 53% and in office workers 28%.

Table 8. Patient's Disease

	Frequency	Percent	Cumulative Percent
Hypertension	49	24.5	24.5
IHD	52	26.0	50.5

Angina	18	9.0	59.5
Chest pain	31	15.5	75
LBBB	13	6.5	81.5
MI	14	7.0	88.5
Heart failure	5	2.5	91
Others	18	9	100.0
Total	200	100.0	

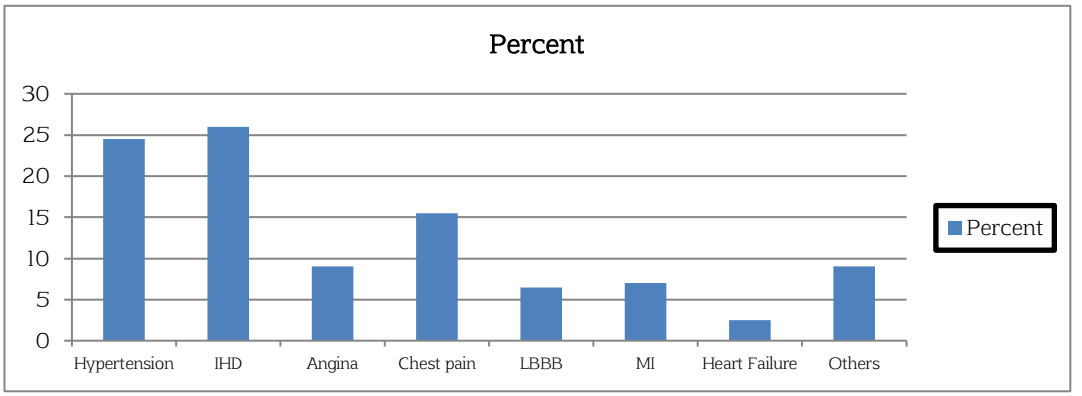

Figure 8.

The patients having hypertension had the percentage of 24.5%. Ischemic heart disease was 26%. Unstable angina was 9%. Chest pain was in 15.5%. MI was in 7%. LB3 was in 6.5%. Heart failure was in 2.5%. Other diseases were in 9% patients. So we conclude that major population had ischemic heart disease, chest pain and hypertension.

Table 9. Family History

	Frequency	Percent	Cumulative Percent
yes	72	36.0	36.0
no	128	64.0	100.0
Total	200	100.0	

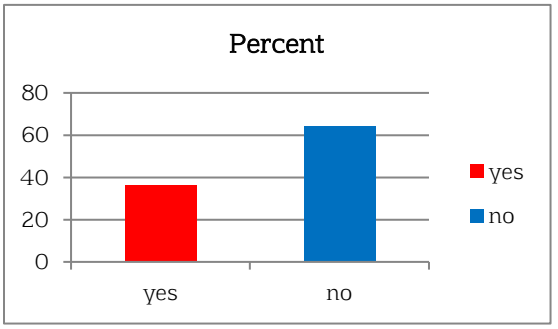

Figure 9:

In the data, 36% people suffering from CVS disease had a family history of heart diseases and 64 % had no family history of such diseases.

Table 10. Smoking

	Frequency	Percent	Cumulative Percent
yes	72	36.0	36.0

no	128	64.0	100.0
Total	200	100.0	

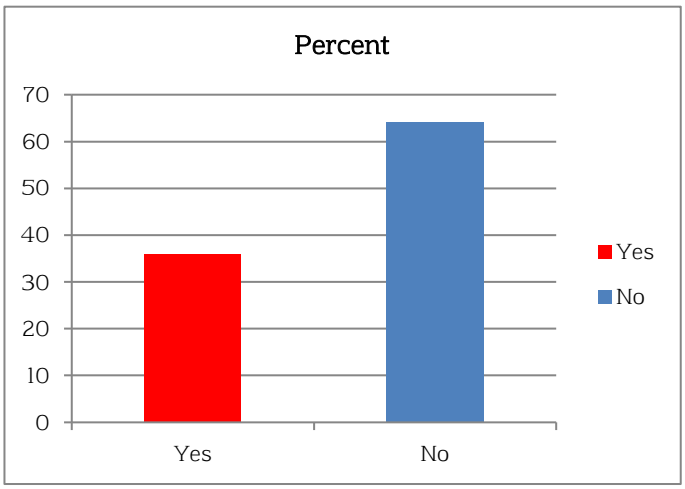

Figure 10. Patients who smoked were 36% and rest of the 64% had no smoking history.

Table 11. Number of Cigarettes

	Frequency	Percent	Cumulative Percent
1/day	1	.5	.5
2/day	20	10.0	10.5
3/day	28	14.0	24.5
1pack/day	15	7.5	32.0
2pack/day	10	5.0	37.0
none	126	63.0	100.0
Total	200	100.0	

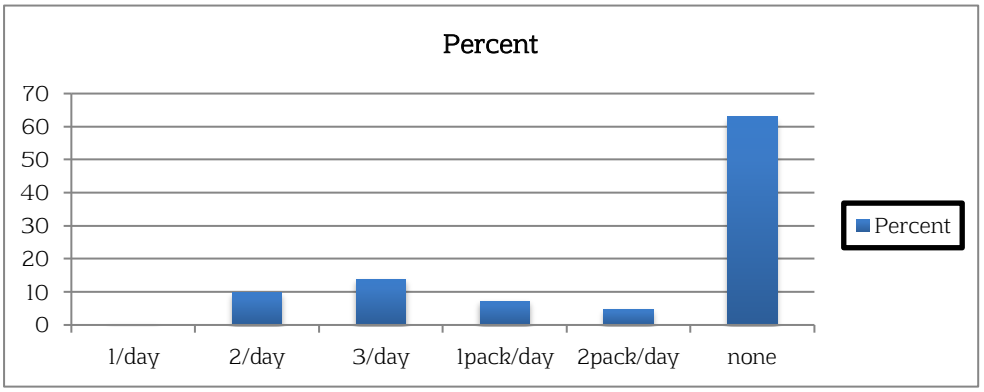

Figure 11:

Table 12. Alcohol Consumption

	Frequency	Percent	Cumulative Percent
yes	4	2.0	2.0
no	196	98.0	100.0
Total	200	100.0	

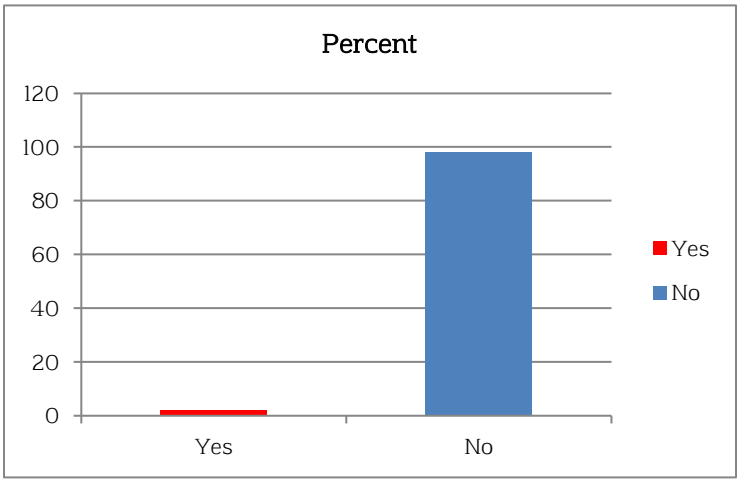

Figure 12. People who consumed alcohol were 2%.

Table 13. Physical Activity

	Frequency	Percent	Cumulative Percent
Yes	50	25.0	25.0
No	150	75.0	100.0
Total	200	100.0	

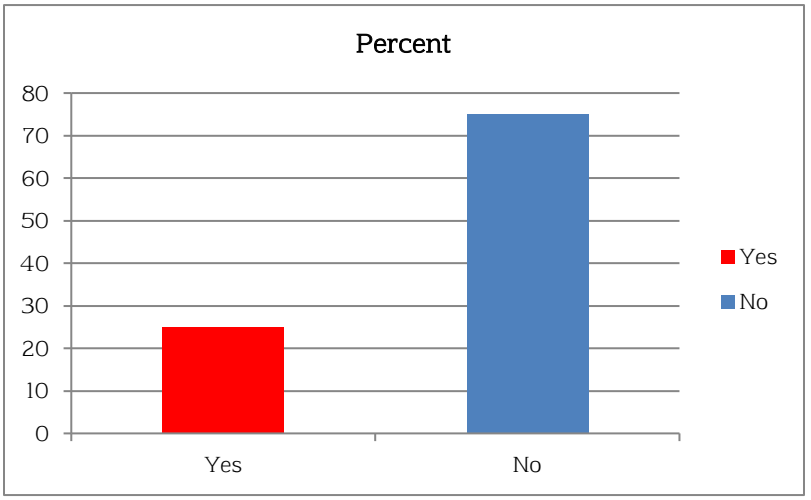

Figure 13:

According to data, majority of population; almost 75% is not doing any sort of exercise. So that's the main reason of such disorders.

Table 14. Trusts on Doctor

	Frequency	Percent	Cumulative Percent
No	66	33.0	33.0
Yes	134	67.0	100
Total	200	100.0	

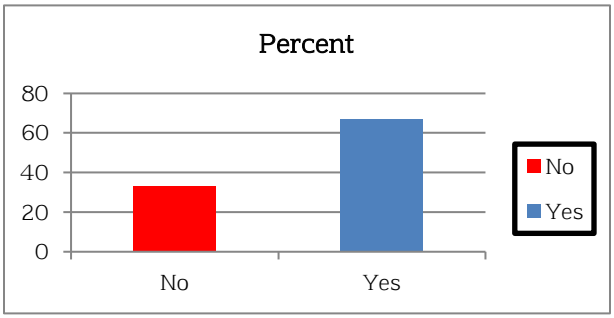

Figure 14:

Most of the in-patients trusted their doctor; 67%, whereas 33% patients did not trust their doctor.

Table 15. Routine Blood Pressure Follow Up

	Frequency	Percent	Cumulative Percent
Follow up	77	38.5	38.5
not follow	123	61.5	100.0
Total	200	100.0	

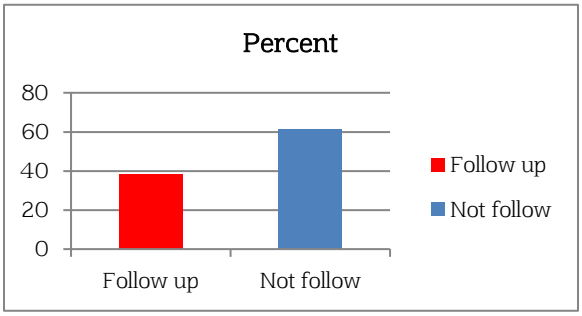

Figure 15:

Most of the patients did not regularly check up their B.P; 61.5%. Other 38.5% did routine checkup of B.P.

Table 16. Medication Taking Behavior

	Frequency	Percent	Cumulative Percent
On time	149	74.5	74.5
not on time	40	20.0	94.5
randomly	11	5.5	100.0
Total	200	100.0	

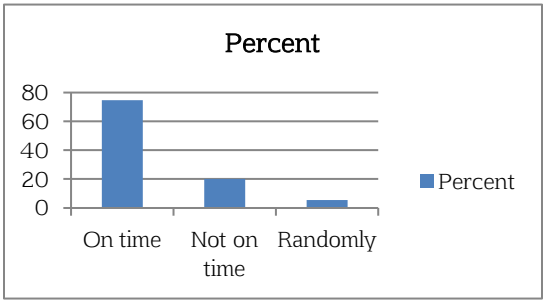

Figure 16:

During treatment as in-patient, 74.5% patients took medicine on time and 20% population doesn't follow the correct dosage time and frequency.

Table 17. Medication stop on feeling better

	Frequency	Percent	Cumulative Percent
stop on feeling relief	128	64.0	64.0
continues therapy	72	36.0	100.0
Total	200	100.0	

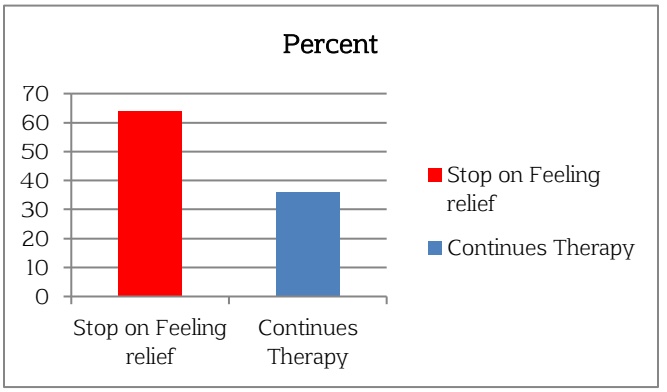

Figure 17:

The majority of the studied population stop medication on feeling relief without completing the course of therapy. Out of 200 people, 128 patients stopped taking medication generally in any disease; 64% and rest of the 36% completed their course of therapy

Table 18. Regular Lab Tests

	Frequency	Percent	Cumulative Percent
Monitoring	106	53.0	53.0
Not monitoring	94	47.0	100.0
Total	200	100.0	

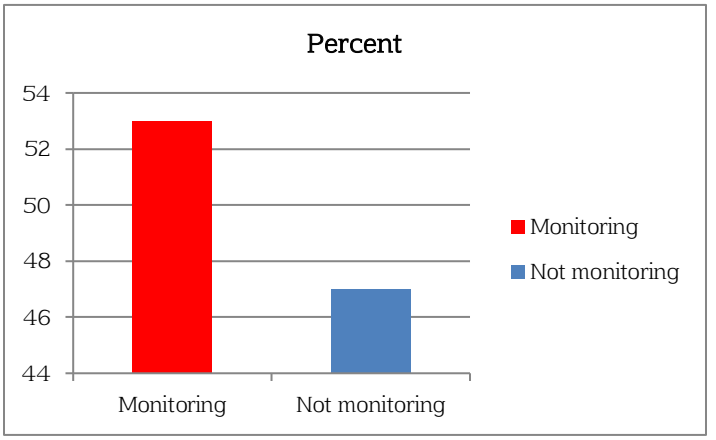

Figure 18:

Of the population studied, 53% people went through lab monitoring routinely and rest of the 47% didn't. So a large population didn't comply to this factor.

Table 19. Reasons for Not Taking Medication

	Frequency	Percent	Cumulative Percent
can't afford	37	18.5	18.5
no availability of medicine	4	2.0	20.5
not like medicine	8	4.0	24.5
due to side effects	39	19.5	44.0
prefer other medication	55	27.5	71.5
just forgot	14	7.0	78.5
i don't know	29	14.5	93.0
Others	14	7.0	100.0
Total	200	100.0	

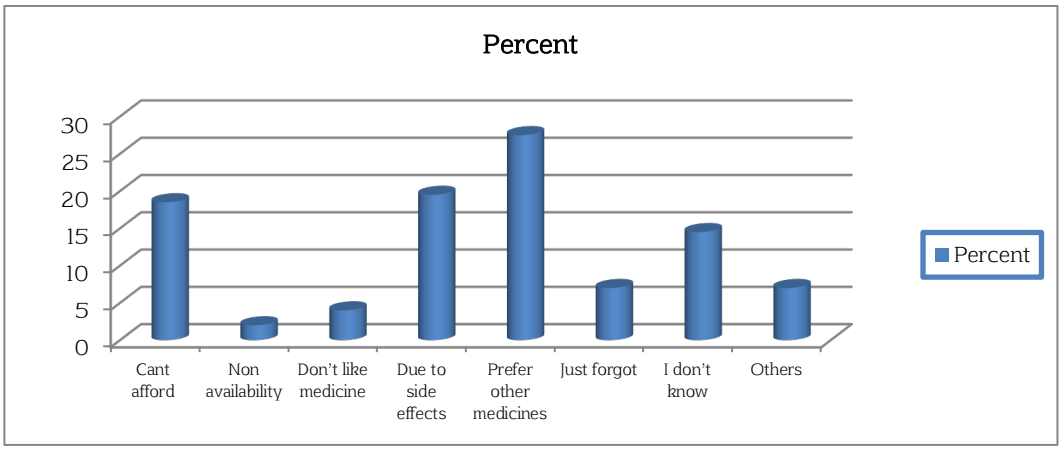

Figure 19:

Most of the patients prefer other medications like homoeopathic and herbal medications and home remedies, almost 27.5%. Most of them do not complete the course of therapies due to ADRs and the high cost of therapy.

Table 20. Clarification of doubt in Therapy

	Frequency	Percent	Cumulative Percent
clarify the doubts	120	60.0	60.0
no clarification	80	40.0	100.0
Total	200	100.0	

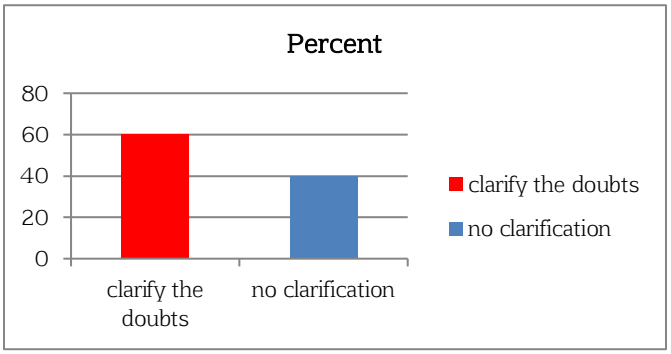

Figure 20:

Most of the patients clarify their doubts about therapy; almost 60%. Rest of them carry on as told by doctor.

Table 21. Alerted by medical Attendant.

	Frequency	Percent	Cumulative Percent
alerted	124	62.0	62.0
not alerted	76	38.0	100.0
Total	200	100.0	

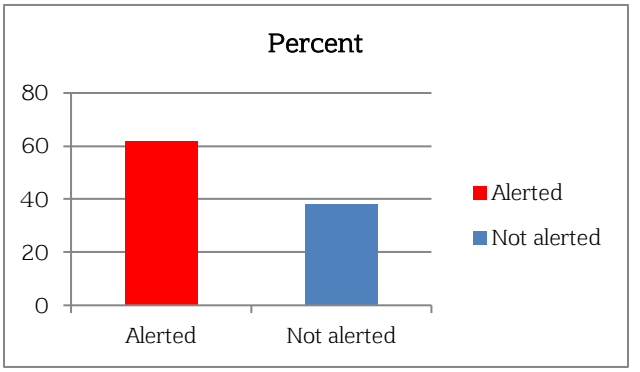

Figure 21:

62% Studied population of in-patients were alerted by their medical attendant.

Table 22. Precautions Taken

	Frequency	Percent	Cumulative Percent
taken	163	81.5	81.5
not taken	37	18.5	100.0
Total	200	100.0	

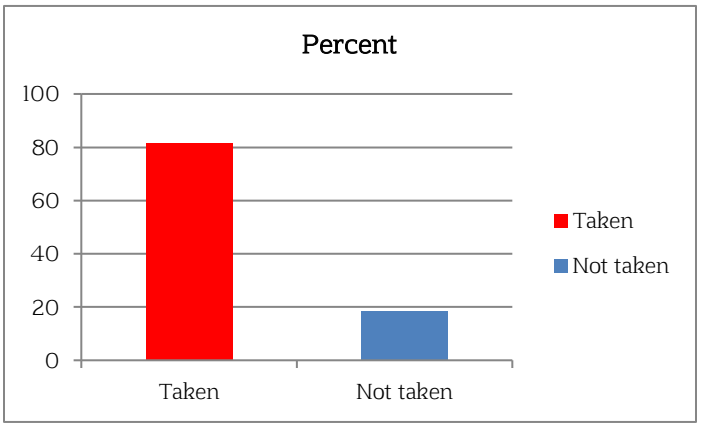

Figure 22:

Most of the patients took precautions; almost 81.5%. Rest were ignorant.

Table 23. Use of Reminders

	Frequency	Percent	Cumulative Percent
Use	42	21	21
Do not use	158	79	100.0
Total	200	100.0	

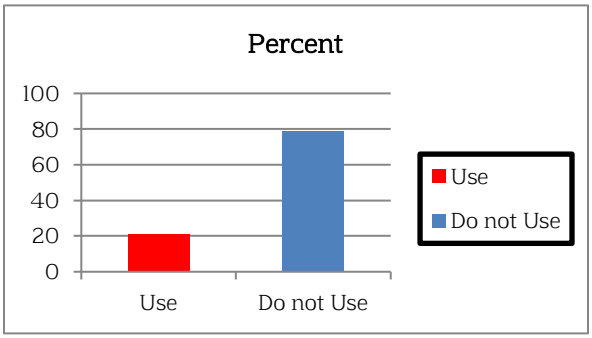

Figure 23:

42% of the patients used different reminders to take medication on-time.

Table 24. Difficulty in taking Medicine

	Frequency	Percent	Cumulative Percent
yes	61	30.5	30.5
no	139	69.5	100.0
Total	200	100.0	

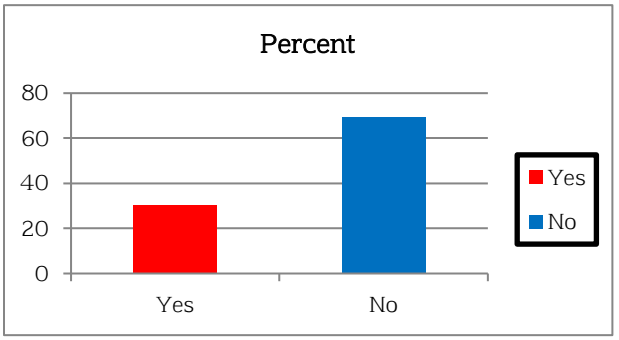

Figure 24:

From the data studied, 30.5% of the patients had difficulty in taking medication, whereas 69.5% did not.

Table 25. Medication Stop on Feeling Worse

	Frequency	Percent	Cumulative Percent
yes	80	40	40
no	120	60	100.0
Total	200	100.0	

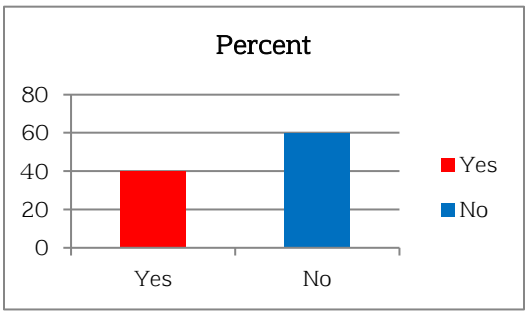

Figure 25:

We found that 40% of the patients stopped taking medication on feeling worse during any stage of their therapy while 60% stick to their regimen.

Table 26. Hypertension

	Frequency	Percent	Cumulative Percent
yes	49	24.5	24.5
no	151	75.5	100.0
Total	200	100.0	

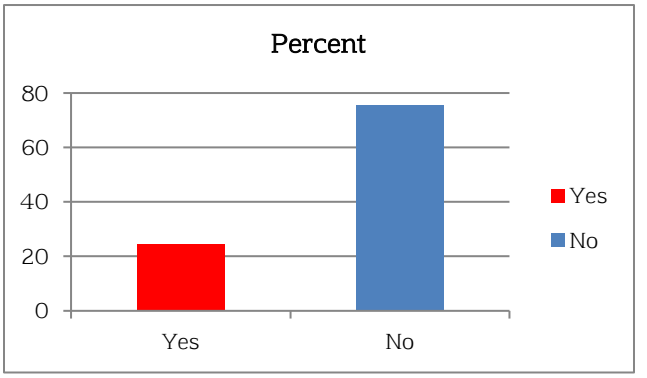

Figure 26:

From the data studied, 24.5% patients were exclusively suffering from hypertension, whereas the other 75.5% population was collectively engaged with other CVS problems.

Table 27. Generalized Summary

Factor	Percentage
Trusts on doctor (NO)	33
Routine Blood Pressure flow up (Follow up)	38.5
Medication taking (on time)	74.5
Medication stop on feeling better (stop)	64
Regular lab test (Monitoring)	53
Clarification of doubt on therapy (clarify doubt)	60
Altered by medical attended (attended)	62
Difficulty in taking medicine (yes)	30.5
Medication stop on feeling worse (yes)	40

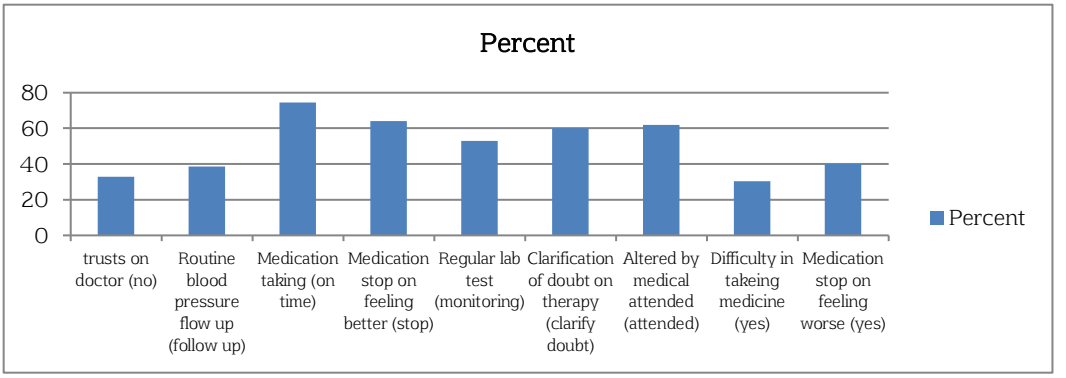

Figure 27:

Conclusion

We studied a selected in-patient population engaged in CVS problems; we came to the conclusion that the major reasons behind patient non-compliance were lack of counselling, lack of trust in the doctor, economic factors regarding medication and patient's ignorance about his own diseases. Furthermore, patients do not complete the course of therapy and rely on quakes and home remedies. The lifestyle of patients also contributes to whether the patient is compliant or not.

So in order to overcome these hindrances, the doctor must counsel the patient properly, take his full life history into consideration while writing a prescription, and he must afterwards keep monitoring that whether the patient is following or not. Reminders should be given for aged patients, and ease is provided if any difficulty in taking medicine. Conclusively, if both the patient and doctor are aware of the cure and therapy and patient compliance can be greatly improved.

References

Anand, P. M., Billmoria, A. R., ed,(1999). Hypertension. An International Monograph 2000. New Delhi. *IJCP Group of Publications*1–17

Cheng, J. W. M., Kalis, M. M., Feifer, S. (2001) Patient-Reported Adherence to Guidelines of the Sixth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Pharmacotherapy 21*(7): 828–841.

Chobanian, A.V., Bakris, G. L., Black, H. R., et al. (2003). The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA 289*: 2560–2572

Hashmi, S.K., Afridi, M.B., Abbas, K. Sajwani R. A., Saleheen, D., et al. (2007) Factors Associated with Adherence to Anti-Hypertensive Treatment in Pakistan. *PLoS ONE 2*(3): e280

Kearney, P.M., Whelton, M. Reynolds, K. Muntner, P. Whelton, P.K., et al. (2005) Global burden of hypertension: *analysis of worldwide data. Lancet 365*: 217–23.

Mitchell, R. S., Kumar, V. Abbas, A. K., Fausto, N. (2007). Robbins Basic Pathology (8th ed.). *Philadelphia: Saunders*. p. 345.

National Health Survey of Pakistan 1990–1994 (1998) Karachi, Pakistan: *Pakistan Medical Research Council.*

Nosé, M. Barbui, C. Gray, R. Tansella, M. (2003). Clinical interventions for treatment non-adherence in psychosis: meta-analysis. *British Journal of Psychiatry 183* (3): 197–206.

Third World Network. Globalization and equitable access to essential drugs. http://www.twnside.org.sg/title/twr120c.htm

World Health Organization Department of Health Statistics and Informatics in the Information, Evidence and Research Cluster (2004). The global burden of disease 2004 update. *Geneva: WHO.*

Youssef, R. M., Moubarak II. (2002) Patterns and determinants of treatment compliance among hypertensive patients. *East Mediterr Health J 8*: 4–5.