

Barriers facing Medication Adherence among Patients with Chronic Hypertension at Out Patient Medical Clinics

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Abstract

Background: Hypertension is a silent killer, a time bomb in both the developed and developing nations of the world. Adherence to long-term therapy for chronic illnesses like hypertension is an important tool to enhance the effectiveness of pharmacotherapy. **Aim:** To assess barriers facing medication adherence among patients with chronic hypertension at outpatient medical clinics. **Study design:** A cross-sectional descriptive design was used. **Sample:** A purposive sample of 200 patients was selected. **Setting:** Outpatient medical clinics of Minia General Hospital in Minia City. **Tools:** Three tools were utilized; **1st tool:** Contains two parts; demographic data and Medical status of patients. **2nd tool:** Assessment scale of patients' adherence to antihypertensive medication. **3rd tool:** Assessment questionnaire of patients' barriers to antihypertensive medication adherence. **Results:** the majority of participating patients were married and about two thirds of them were illiterate. In addition more than half of them had poor adherence to antihypertensive medication, there was highly statistically significant relation between participants' level of adherence and their blood pressure measurement. **Conclusion:** The most frequent barriers of antihypertensive medication adherence were; fear from side effects, medication costs and unavailability or no access of medication. **Recommendations:** Providing medications free to patients attending health clinics to overcome cost of medication that can affect adherence to prescribed medications

Keywords: Barriers, Hypertension, Medication Adherence, Patients

Introduction

Hypertension (HTN) conceptually means the presence of a blood pressure at which an otherwise healthy person would have an increase in cardiovascular risk that could be mitigated through blood pressure-lowering treatment (Fuchs, 2018). For clinical judgment HTN exists when blood pressure (BP) is 140/90 millimeters of mercury (mmHg) or above (Hiremath et al., 2020).

Hypertension (HTN) considered as the "silent killer," is physically devastating because, when BP becomes uncontrolled, fatal complications arise (Joshua, 2018). Epidemiological studies have indicated that cardiovascular problems are largely in a linear relationship with blood pressure. Worldwide, hypertension is responsible for greater than 50% of strokes and heart attacks (Mills et al., 2020). So once appropriate Blood pressure measurement has confirmed a diagnosis of hypertension, it requires lifetime management to be controlled through non-pharmacological (lifestyle measures) as well as pharmacological means (Skeete et al., 2020).

The greatest potential for improving control of hypertension lies in two ways: first is the awareness about the disease and second is the adherence to both pharmacological and non-pharmacological treatment (Karmacharya et al., 2017). Adherence is defined as a patient's medically recommended lifestyle changes. Furthermore, adherence measures the extent to which a person's behavior coincides with medical or health advice (Burnier & Egan, 2019). Despite the availability of effective antihypertensive drug therapy, half of the hypertensive patients do not adhere to the prescribed regimens and less than 25% of patients treated for hypertension achieve optimum blood pressure (Asgedom et al., 2016).

Multiple barriers are responsible for poor BP control in developing countries. These vary from macro level health system and healthcare provider factors to individual patient level factors. The health system factors that have been found important are rural residence and non-availability of healthcare facilities (Schober et al., 2020). Individual factors are poverty, low educational status, low spousal education, cost of drugs and healthcare, personal factors (psychosocial, health-related inertia), and drug-related issues, Poor adherence contributes to a lack of good blood pressure control in more than two-thirds of people living with hypertension. It can be unintentional (such as forgetting or lack of knowledge) or can be intentional, whereby patients decide not to take treatment based on their personal beliefs about their illness and treatment. (Mamaghani et al., 2020).

Community health nurses (CHN) should educate patients and convince them about the benefits of the regimen, CHN should inform patients about the chronic disease and the complications associated with non-adherence to achieve medication adherence. Other important behavior in terms of taking prescribed medication, following diets or executing interventions are communication, good quality in a patient-nurse relationship, and collaboration of a team of healthcare professionals (Wolf and Narkiewicz, 2018).

Significance of the Study

Based on the revised Global Burden of Disease study (GBD) estimates in 2019, high systolic blood pressure affects over 4 billion adults. Although the prevalence of raised BP remained stable in high-income countries for the last 1–2 decades, it is still increasing in low- and middle-income countries (Jeemon et al., 2021).

Ministry of health and population (MOHP) in Egypt (2016) published that 17% of women and men were classified

as hypertensive. The problem is complicated by the low awareness rates, only 38% of hypertensive Egyptians were aware of having high blood pressure, only 24% were receiving treatment, whereas control rates (<140/90 mmHg) were 8% (Elmosalami et al., 2020). In Egypt, the prevalence of hypertension among the highest in the world with a national estimate of 26.3% in the adult population (Soliman et al., 2020).

Poor awareness and adherence to blood pressure control have been identified as the main cause of failure to control hypertension, while Control of BP leads to a reduction in cardiovascular events in terms of approximately 50% reduction in heart failure, approximately 40% reduction in stroke, and approximately 20%–25% reduction in Myocardial infarction (Jankowska-Polańska et al., 2016)

Aim of the Study

The current study aimed to assess barriers facing medication adherence among patients with chronic hypertension at Out Patient Medical Clinics

Research Questions:

- What are the barriers facing medication adherence among patients with chronic hypertension?
- Is there a relationship between studied patients' level of antihypertensive medication adherence and their socio-demographic data?

Subjects and Methods:

Research Design:

A descriptive cross-sectional research design was utilized to fulfill the purpose of this study.

Setting:

This study was carried out in outpatient medical clinics at Minia General Hospital at Minia City.

Sample:

A purposive sampling technique was utilized in this study. According to the registration office of Minia General Hospital, the total numbers of patients attending the medical out-patient clinics during the last year 2019/2020 were (420) patients diagnosed with hypertension. Based on this, the sample size will be calculated according to the following equation (Ahmad & Halim, 2017) for the sample size of the descriptive study design.

$$n = \frac{\frac{z^2 p (1-p)}{m^2}}{1 + \frac{z^2 p (1-p)}{m^2 N}} = \frac{\frac{(1.96)^2 (0.5) (0.5)}{(0.05)^2}}{1 + \frac{(1.96)^2 (0.5) (0.5)}{(0.05)^2 420}} = 200$$

Description:

n = required sample size.

z = is the Z score at 0.025 (1.96). P = Prevalence of Patients diagnosed with hypertension at the medical out-patient clinics in 2018/2019(0, 5).

m = Margin of error at 5 % (standard value of 0.05).

N= population size

Based on the previously mentioned formula, a sample of (200) patients will selected by purposive sampling technique.

Inclusion criteria:

- Patients with chronic hypertension at age of ≥ 18 year.

Data collection tool:

Data was collected through a structured interviewing questionnaire that was designed by the researcher after extensive reviewing of the related literature. It was consisted of three tools as following:

Tool I: It was contained tow parts:

Part 1: Demographic data:

Was consist of seven (7) items related to socio-demographic characteristics of the patient such as age, gender, residence, educational level, occupation, marital status, and type of family.

Part 2: Medical status:

Was consisted of medical data of patient as (Family history of hypertension, Blood pressure measurements& Time of starting anti-hypertensive medication)

Tool II: Medication Adherence Likert Scale among Patients with Hypertension :

A 3-point Likert scale of 11 items was developed to measure the level of adherence to the drug treatment regimen. this tool was adapted by **Morisky Likert Scale(MLS) (Morisky et al.,2008)** and modified by the researcher for easy applicability, it included 12 questions such as “How often do you do the following: take your medicine as prescribed, forget to take your medicine, don’t care about taking your medicine, leave doses of medicine because you feel better, leave doses of medicine and take alternative remedies? ...etc.”

Scoring system:

The scoring is as follows: Never = 1, Sometimes = 2, Always = 3. The scores vary from (33-99) points and are classified into three levels as follows

1. Poor adherence to medication from 33 < 59.7 scores (less than 60%).
2. Fair adherence to medication from 59.8 – 69.8 scores (60%-70%).
3. Good adherence to medication > 69.9 scores (>70 %)

Tool III: Barriers to medication adherence assessment questionnaire among patients with hypertension, this questionnaire developed by the researcher based on relatd literatures (Svarstad et al., 2018; María et al., 2019 & Mamaghani et al., 2020) that included (4) items to assess barriers of antihypertensive medication adherence as:

- 1-Barriers related to patient
- 2-Barriers related to "hypertension as a disease"
- 3- Barriers related to medication
- 4-Barriers related to health care system

Data Collection procedure

An official permission from the director of Minia General Hospital was obtained. Patients who met the selection criteria was invited to participate in the study. The purpose and the nature of study was explained to each participant individually and verbal informed consent was obtained.

The investigator visited outpatient medical clinics of Minia General Hospital three days per week (Saturday,

Monday and Wednesday from 9Am to 2 Pm) to recruit the study sample. Data collection was conducted over six months extending from the beginning of June to end of December (2021), The average number interviewed subjects were 5 persons per day and the average time taken for each was around 20-30 minutes depending on the response of each patient.

Validity and Reliability:

The study tool and scales was tested for content validity by a jury of five experts in the field of community health nursing, and reliability was tested statistically.

Pilot study:

A pilot study was conducted on 10% of patients (20 patients) to test the validity and reliability of the study and applicability of the tool and to estimate the time required to fill the sheets. Modifications were done in the study tools based on

the pilot study; this sample was included in the study after modification.

Ethical consideration:

Written approval was obtained from the research ethics committee of the faculty of nursing, Minia University. Informed oral consent was obtained from the participants of the study after informing them about the purpose and nature of the study. Each assessment sheet was coded, and patient’s name was not appear on the sheets for the privacy and confidentiality. Patients were assured that they have the right to withdraw at any time from the current study .

Statistical Analysis:

The collected data was tabulated, analyzed, and computerized by using SPSS (statistical package for the social science version 22). Descriptive data was expressed as numbers and percentages. Quantitative data was presented by the mean and standard deviation. Statistics was utilized to present study data. The level of significance was accepted at p value < 0.05

Results:

Table 1: Socio-demographic characteristics of studied patients at outpatient medical clinics of Minia General Hospital at Minia City, 2021 (n = 200).

Socio-demographic data of participating patients	No.	%
Sex		
Male	82	41.0
Female	118	59.0
Age (years)		
20 ≤ 30	4	2.0
31 ≤ 40	20	10.0
41 ≤ 50	56	28.0
51 ≤ 60	62	31.0
> 60	58	29.0
Mean ± SD	52.3 ± 11.86 years	
Residence		
Urban	46	23.0
Rural	154	77.0
Marital Status		
Single	8	4.0
Married	163	81.5
Divorced	3	1.5
Widowed	26	13.0
Education		
Illiterate	133	66.5
Read and write	27	13.5
Basic education	20	10.0
Secondary	16	8.0
University	4	2.0
Occupation		
Worked	22	11.0
Not worked	63	31.5
House wife	104	52.0
Retired	11	5.5
Monthly income		
Insufficient	116	58.0
Sufficient	84	42.0
Smoking habits		
Not smoker	177	88.5
Smoker	23	11.5

Table (1) Illustrates that distribution of studied patients according to their socio-demographic characteristics, it shows that mean age of them were 52.3 ± 11.86 years, 81.5% of them were married, 77.0% were from urban area and 66.5% of them were illiterate. Regarding to their occupation, 52.0 % of them were house wives and more than half of them (58.0%) have not enough monthly income

Table 2: Distribution of studied patients according to their adherence to antihypertensive medication at outpatient medical clinics of Minia General Hospital at Minia City, 2021 (n = 200).

Variables	Always		Sometimes		Never	
	No.	%	No.	%	No.	%
Forgot to take your medicine before	110	55.0	84	42.0	6	3.0
Ignore your medication	53	26.5	119	59.5	28	14.0
Leave some doses of medication when you feel well	47	23.5	94	47.0	59	29.5

Variables	Always		Sometimes		Never	
	No.	%	No.	%	No.	%
Leave doses of treatment while you are acutely sick without referring to the doctor	135	67.5	57	28.5	8	4.0
Change medication schedules without referring to the doctor	87	43.5	99	49.5	14	7.0
Take medication less than the prescribed dose	72	36.0	101	50.5	27	13.5
Take measures to alert you to take your medicine at the scheduled time	64	32.0	29	14.5	107	53.5
Adhere to the prescribed medication plan completely	62	31.0	112	56.0	26	13.0
Stop medical follow-up or contact your doctor before completing treatment.	29	14.5	111	55.5	60	30.0
Take your dose with you when go out or travel and trips	73	36.5	90	45.0	37	18.5
Take a prescription for someone else who have hypertension.	117	58.5	67	33.5	16	8.0

Table (2) represents distribution of studied patients according to their adherence to antihypertensive medication, it reveals that 55.0 % of participants always forget to take medicine, 26.5% of them reported that they always ignored their medication, additionally 67.5% of them always leave doses of treatment while they are acutely sick without referring to the doctor. Also 47.0 % of them sometimes leave some doses of medication when they feel well.

More than half (53.5%) of participants never take measures to alert them to take medicine at the scheduled time, only 18.5% of them take medicine dose with them when go out or travel and trips while more than half of them (58.5%) always take a prescription for someone else who has hypertension.

Table 3: percentage distribution of studied patients regarding their Barriers of antihypertensive medication adherence among studied patients at outpatient medical clinics of Minia General Hospital at Minia City, 2021 , (n = 200).

Variables	No.	%
Patient related barriers		
Forgetfulness.	114	57.0
Patients beliefs: Beliefs that the medication are not effective (doesn't affect chronic disease)	139	69.5
Multiple diseases.	47	23.5
Cognitive disorders as (dementia or Amnesia).	9	4.5
Barriers related to hypertension as a disease		
Fixed symptoms that could be used to it.	123	61.5
Perceived no severity of disease.	94	47.0
Hypertension is a chronic disease (permanent)	77	38.5
No symptoms or no immediate complaint	68	34.0
Decreased symptoms of the disease.	15	7.5
Barriers related to antihypertensive medication		
Frequent side effects	156	78.0
Medication costs	154	77.0
Unavailability/ no access of medication	143	71.5
Benefits of the medications are not clear	125	62.5
The number of medications is too many	82	41.0
Repelling formulas, such as foul-tasting formulas	68	34.0
Difficulties in medication usage (as difficulty opening the medicine package, holding very small tablets, difficulty swallowing)	63	31.5
Barriers related to health care system		
Patients residences are far from care centers and doctors	117	58.5
Unclear usage instructions.	107	53.5
Multiple doctors (having a different doctor each time for a consultation).	80	40.0
The duration of the explanation for the use of the treatment is short	14	7.0
Lack of attention by the treating team to commitment to treatment	8	4.0
Weakness of the relationship between the patient and his doctor.	4	2.0

Table (3): illustrates barriers of antihypertensive medication adherence as reported by studied patients, it shows that beliefs that drug intake doesn't affect chronic disease (69.5%) and forgetfulness (57.0%) were the most reported patient related barriers. As regard to hypertension disease related barriers, 61.5 % of them reported "fixed symptoms that can be used to it" and 47.0% of them reported "perceived no severity of disease".

Regarding to antihypertensive medication related barriers, fear from frequent side effects (78.0%), Medication costs (77.0%) and unavailability/ no access of medication (71.5%) were the most frequent barriers. Concerning health care system related barriers, 58.5% of them reported residences are far from care centers and doctors, unclear usage instructions (53.5%) and multiple doctors (having a different doctor each time for a consultation) (40.0%).

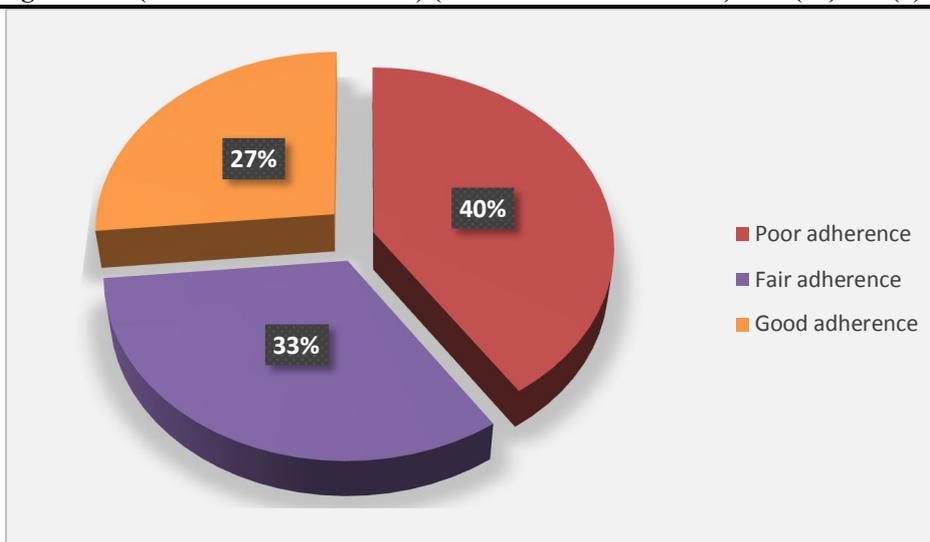


Figure (1): Antihypertensive medication adherence level of studied patients at outpatient medical clinics of Minia General Hospital at Minia City, 2021 (n = 200).

Figure (1) illustrates studied patients’ total level of antihypertensive medication adherence, it showed that 40.0% of patients had poor adherence level to antihypertensive medication while 27.0% of them were good adhere to antihypertensive medication.

Table 4: Relationship between studied patients’ level of antihypertensive medication adherence and their socio-demographic data at outpatient medical clinics of Minia General Hospital at Minia City, 2021, (n = 200).

Socio-demographic variables	Participants’ level of antihypertensive medication adherence			X ²	(P – value)
	Poor adherence (n=81)	Fair adherence (n=66)	Good adherence (n=53)		
Sex					
Male	35	20	27	7.452	.05*
Female	46	46	26		
Age (y/ears)					
20 ≤ 30	0	3	1	33.839	.000**
31 ≤ 40	1	9	10		
41 ≤ 50	26	26	4		
51 ≤ 60	25	14	23		
> 60	29	14	15		
Residence					
Urban	22	14	10	11.422	.04*
Rural	59	52	43		
Marital Status					
Single	2	6	0	13.486	.03*
Married	66	54	43		
Divorced	3	0	0		
Widowed	10	6	10		
Education					
Illiterate	57	30	46	39.407	.000**
Read and write	13	8	6		
Basic education	8	12	0		
Secondary	3	13	0		
University	0	3	1		
Occupation					
Employee	8	7	7	3.230	.780 ^{NS}
Unemployment	26	17	20		
House wife	43	37	24		
Retired	4	5	2		
Monthly income					
Insufficient	50	46	25	8.947	.049*
Sufficient	31	20	28		
Smoking habits					
Not smoker	74	61	42	6.109	.047*
Smoker	7	5	11		

Test used; Chi-square ** Highly statistically significant at P – value ≤ .01. * statistically significant at P – value ≤ .05 NS= Not statistically significance

Table (4): represents the relationship between participants’ level of antihypertensive medication adherence and their socio-demographic data, it illustrates that there were highly statistically significant relation between participants’ level of adherence and their socio-demographic data related to their age and education where P-value were 0.000 and 0.000 respectively. Also, there were statistically significant relation between participants’ level of adherence and their sex, residence, marital status, monthly income and smoking habits where P-value were 0.05, 0.04, 0.03, 0.04 and 0.04 respectively.

Table 5: Correlation between participants' antihypertensive medication adherence and their medical variables at outpatient medical clinics of Minia General Hospital at Minia City, 2021 , (n = 200).

Medical data	r. value	P – value
Systolic blood pressure measurements	-.637-	.000**
Diastolic blood pressure measurements	-.272-	.000**
Family history of hypertension	-.130-	.067 ^{NS}
Duration of hypertension	.063	.374 ^{NS}
Time of starting hypertension medication	.245	.000**
Number of drugs currently in use	-.186-	.008**
Medication costs	-.839-	.000**
Place of hypertension follow up	.356	.000**
Place of follow-up treatment close to /or far from residence	-.226-	.001**
Uncontrolled blood pressure during the last month	-.534-	.000**

Test used: Pearson correlation NS= Not statistically significance

* statistically significant at $P - value \leq .0$ ** Highly statistically significant at $P - value \leq .01$.

Table (5): reveals that there was a strong negative correlation between participants' antihypertensive medication adherence and its costs where r_ value was -.839- with highly statistically significant differences where p_ value was 0.000, also there was a moderate negative correlation between participants' antihypertensive medication adherence and their systolic blood pressure measurements and presence of uncontrolled blood pressure during the last month where r_ value was -.637- and -.534- respectively with highly statistically significant differences where p_ value was 0.000 and 0.000 respectively.

Additionally, there were weak negative correlation between participants' antihypertensive medication adherence and their diastolic blood pressure measurements, number of drugs currently in use and place of follow-up treatment close to /or far from residence where r_ value was -.272-, -.186- and -.226- respectively with highly statistically significant differences where p_ value was 0.000, 0.000 and 0.001 respectively.

Furthermore, there were weak positive correlation between participants' antihypertensive medication adherence and their time of starting hypertension medication and place of hypertension follow up where r_ value was .245 and .356 respectively with highly statistically significant differences where p_ value was 0.000 and 0.000 respectively

Discussion

Based on the result of the present study, it has been noticed that mean age of studied patients was more than fifty years; this may be due to that studied patients at this age suffer from many chronic diseases

These findings were compatible with **DiMatteo, et al., (2019)** who cited in their study about patient adherence and medical treatment outcomes that the mean age of respondents was 59.62 years, also current findings agree with **Bramley et al., (2016)** who studied "Relationship of blood pressure control to adherence with antihypertensive monotherapy in 13 managed care organizations" who cited the average age of the patient was fifty-five yrs.

Additionally, this finding was in line with **Farmer, (2019)** who studied "Methods for measuring and monitoring medication regimen adherence in clinical trials and clinical practice in USA" who found that less than one third of patients with chronic hypertension their age more than sixty years old, also this result was inconsistent with **Morisky et al., (2019)** who studied "Concurrent and predictive validity of a self-reported measure of medication adherence in Saudi Arabia" who found that more than half of the studied sample aged from twenty to thirty years old. Also, this study inconsistent with **Haynes et al., (2020)** who studied "Helping patients follow prescribed treatment in Qatar " who found that one third of the studied sample aged from twenty to thirty years old.

The present study illustrated that the most of the studied patients were married and more half of them were illiterate and only about two percent were with university education, from researcher points of view, this may be related to that our participant were collected from villages, house wife and the Egyptian rural culture not allowed for women to attend or complete their education level which confirmed by **Ali et al., (2020)** who studied "Prevalence and Predictors of poor antihypertensive medication adherence in an urban health clinic setting" who said that Upper and Lower Egyptian rural culture not allowed for women to go to school or complete

their education level, also this result is in the same line with **Cook et al.,(2019)** who studied "Concordance among three self-reported measures of medication adherence and pharmacy refill records in Saudi Arabia" who found that less than one third of the studied sample have high school education.

According to occupation, the present study found that most of participants were housewives, this finding was in the same line with **Svarstad et al., (2018)** who studied "The brief medication questionnaire: a tool for screening patient adherence and barriers to adherence in Hispanic families screening" who found that less than half of the studied mothers were unemployed.

Regarding to smoking habits of participants, the vast minority of them were smoker, and this confirmed by **Kannel WB & Higgins, (2021)** who studied "Smoking and hypertension as predictors of cardiovascular risk in population studies" who revealed that less than one third of the studied sample were smoker one pack of cigarettes a day.

Additionally, the current study showed that the most frequent barriers reported by participants were; fear from frequent side effects, the existing study was similar to study with **Khanna, et al (2019)** who studied "A study of the basic and derived anthropometric indices among the healthy adults of Amritsar city (Punjab) having family history of hypertension" who found that the most frequent barriers reported by participants were; fear from frequent side effects.

Additionally, the current study highlighted that "beliefs that drug intake doesn't affect chronic disease" and "forgetfulness" were the most reported "patient" related barriers of adherence to antihypertensive medication from the researcher point of view this may be due to false beliefs about chronic diseases.

The existing study was similar to study with **Lopes, et al (2021)** who studied "Hemodynamic and metabolic profile in offspring of malignant hypertensive parents Hypertension" who found that beliefs that drug intake doesn't affect chronic disease as reported by more than half of studied

patients and forgetfulness were the most reported patient related barriers.

Concerning participants' total level of antihypertensive medication adherence, the current study revealed that about two thirds of patients had poor adherence level to antihypertensive medication. From the researcher point of view this may be due to their advanced age, forgetfulness, and a poor relationship with the medical staff, their doctors ever encourages them to take their medications as prescribed.

The existing study was similar to study with **Liu, et al (2019)** who studied "Family history of hypertension and the risk of overweight in Japanese children" who found that about half of patients had poor adherence level to antihypertensive medication while more than a quarter of them were good adhere to antihypertensive medication.

In the present study, there was highly statistically significant relation between participants' level of adherence and their socio-demographic data related to their age and education, From the researcher point of view this may be due to lack of information among illiterate participants and the older the patient was , the more drug adherence was because understanding the importance of medication adherence and could have more complication ,the existing study was similar to study of **Carretero & Oparil (2020)** who studied "Essential hypertension.: definition and etiology. " who illustrated that there was highly statistically significant relation between participants' level of adherence and their socio-demographic data related to their age and education.

The current findings also illustrated that there was statistically significant relation between participants' level of adherence and their duration of hypertension, time of starting hypertension medication, number of drugs currently in use, medication costs, place of hypertension follow up and presence of uncontrolled blood pressure during the past month. From the researcher's point of view, this may be due to high costs of medication and place of hypertension follow up was far from patient's residence. These findings were similar to study with **Mann, 2020** who studied "Choice of drug therapy in primary (essential) hypertension" who found that there was statistically significant relation between participants' level of adherence and their duration of hypertension, time of starting hypertension medication, number of drugs currently in use, medication costs, place of hypertension follow up and presence of uncontrolled blood pressure during the past month.

Furthermore, the present study revealed that there was highly statistically significant relation between participants' level of adherence and their blood pressure measurements From the researcher point of view this may be due to participants don't know how to assess their blood pressure .It was similar to study with **Kearney, et al (2018)** who studied "Global burden of hypertension" who found that there was highly statistically significant relation between participants' level of adherence and their blood pressure measurements.

Moreover, the present study illustrated that there was negative correlation between participants' antihypertensive medication adherence and their diastolic blood pressure measurements, number of drugs currently in use and place of follow-up treatment close to /or far from residence. From the researcher's point of view, experiences of low pressure measurements, little number of drugs currently in use and place of follow-up treatment close to residence could

contribute to increase the participants' level of medication adherence. The existing study was similar to study with **McDonald, et al., (2020)** who studied "Interventions to enhance patient adherence to medication prescriptions" who found that there was weak negative correlation between participants' antihypertensive medication adherence and their diastolic blood pressure measurements, number of drugs currently in use and place of follow-up treatment close to /or far from residence.

The existing study was similar to **Lopes, et al (2021)** who studied "Hemodynamic and metabolic profile in offspring of malignant hypertensive parents Hypertension" who found that beliefs that drug intake doesn't affect chronic disease as reported by more than half of studied patients and forgetfulness were the most reported patient related barriers.

Conclusion

The study was revealed that less than half of studied patients had poor adherence level to antihypertensive medication adherence. There was highly statistically significant relation between participants' level of adherence and their blood pressure measurements/control. The most frequent barriers reported by participants were; fear from frequent side effects, Medication costs and unavailability/ no access of medication, beliefs that drug intake doesn't affect chronic disease, fixed symptoms of disease that they were used to it, residences are far from care centers and doctors, forgetfulness, unclear usage instructions, perceived no severity of disease and having a different doctor each time for a consultation.

Recommendations

From this study the following recommendations can be suggested:

- Regular implementation of educational programs through mass media to increase public awareness about hypertension implications, adherence to lifestyle modifications, adherence to treatment and follow up.
- Adopting family member's involvement to overcome patient's related barriers as forgetfulness will be necessary to improve medication adherence.
- Health care professionals should make list of essential drugs and promote generic prescription.
- A collaborative care approach should facilitate the education of patients about the benefits of medications and the importance of continuous medication use especially in the treatment.
- Routine and opportunistic screening should be encouraged for screening, diagnosis, investigating, and monitoring hypertensive patients can significantly increase hypertension awareness.
- Providing medications free to patients attending health clinics to overcome cost of medication that can affect adherence to prescribed medications.
- More researches are suggested to examine the effectiveness of adherence enhancing intervention & develop more effective strategies suitable for different population, diseases and drug formulations to improve medication adherence among Patients with Hypertension

Reference

1. Ahmad, H., & Halim, H. (2017). Determining sample size for research activities. *Selangor Business Review*, 20-34.
2. Ali M, Hyre A, Krousel-Wood MA, Muntner P (2020). Prevalence and Predictors of poor antihypertensive medication adherence in an urban health clinic setting. *J Clin Hypertension*; 9: 179–86
3. Asgedom, S. W., Gudina, E. K., & Desse, T. A. (2016). Assessment of blood pressure control among hypertensive patients in Southwest Ethiopia. *PLoS One*, 11(11), e0166432. Hypertension-related knowledge, attitudes and life-style practices among hypertensive patients in a sub-urban Nigerian community. *J. Public Health Epidemiol.* 2010;2:71–77. [Google Scholar.
4. Bramley TJ, Gerbino PP, Nightengale BS (2016). Relationship of blood pressure control to adherence with antihypertensive monotherapy in 13 managed care organizations. *J Manag Care Pharm*; 12: 239–45
5. Burnier, M., & Egan, B. M. (2019). Adherence in hypertension: a review of prevalence, risk factors, impact, and management. *Circulation research*, 124(7), 1124-1140 .
6. Carretero OA, Oparil S (2020). Essential hypertension. Part I: definition and etiology. *Circulation.*;101(3):329–335.
7. Cook CL, Wade WE, Martin BC (2019). Concordance among three self-reported measures of medication adherence and pharmacy refill records. *J Am Pharm Assoc*; 45: 151–9
8. DiMatteo MR, Giordani PJ, Lepper HS (2019). Patient adherence and medical treatment outcomes: a meta-analysis. *Med Care*; 40: 794–811.
9. Elmosalami, M. A., Mahammoud, A. A., & Al-Khawaja, M. (2020). Hypertension and Health-Related Quality of Life: A Community Based Epidemiological Study in an Egyptian Village. *International Journal of Medical Arts*, 2(1), 232-240 .
10. Farmer KC (2019). Methods for measuring and monitoring medication regimen adherence in clinical trials and clinical practice. *Clin Ther*; 21: 1074–90
11. Fuchs, F. D. (2018). Risks of high blood pressure and goals for treatment *Essentials of Hypertension* (pp. 1-38): Springer.
12. Haynes RB, McDonald HP, Garg AX (2020). Helping patients follow prescribed treatment: clinical applications. *JAMA*; 288: 2880–3.
13. Hiremath, S., Sapir-Pichhadze, R., Nakhla, M., Gabor, J. Y., Khan, N. A., Kuyper, L. M., . . . Rabi, D. M. (2020). Hypertension Canada’s 2020 evidence review and guidelines for the management of resistant hypertension. *Canadian Journal of Cardiology*, 36(5), 625-634 .
14. Jankowska-Polańska, B., Uchmanowicz, I., Dudek, K., & Mazur, G. (2016). Relationship between patients’ knowledge and medication adherence among patients with hypertension. *Patient preference and adherence*, 10, 2437-2447.
15. Jeemon P, Séverin T, Amodeo C, Balabanova D, Campbell NRC, Gaita D, Kario K, Khan T, Melifonwu R, Moran A, Ogola E, Ordunez P, Perel P, Piñeiro D, Pinto FJ, Schutte AE, Wyss FS, Yan LL, Poulter NR, Prabhakaran D (2021). World Heart Federation Roadmap for Hypertension - A Update. *Glob Heart*. 63. doi: 10.5334/gh.1066. PMID: 34692387; PMCID: PMC8447967.
16. Joshua, N. (2018). Assessing the knowledge, awareness, attitudes, and perceptions of hypertension among adults (19-60 years) in the Sunyani Municipality, Brong Ahafo Region, Ghana .
17. Kannel WB1 & Higgins M (2021). Smoking and hypertension as predictors of cardiovascular risk in population studies. *Journal of hypertension. Supplement: Official Journal of the International Society of Hypertension*, 01 Sep 1990, 8(5): S3-8. PMID: 2286855
18. Karmacharya, B. M., Koju, R. P., LoGerfo, J. P., Chan, K. C. G., Mokdad, A. H., Shrestha, A., . . . Fitzpatrick, A. L. (2017). Awareness, treatment, and control of hypertension in Nepal: findings from the Dhulikhel Heart Study. *Heart Asia*, 9(1), 1-8 .
19. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J (2018). Global burden of hypertension: analysis of worldwide data. *Lancet.*; 365:217–223.
20. Khanna N, Sharma RS, Sidhu RS (2019). A study of the basic and derived anthropometric indices among the healthy adults (20–30 years of age) of amritsar city (punjab) having family history of hypertension. *Int J Biol Med Res*;2(3):743–746.
21. Liu J, Sekine M, Tatsuse T, Hamanishi S, Fujimura Y, Zheng X (2019). Family history of hypertension and the risk of overweight in Japanese children: results from the Toyama Birth Cohort Study. *J Epidemiol.*;24(4):304–311.
22. Lopes HF, Bortolotto LA, Szlejf C, Kamitsuji CS, Krieger EM (2021). Hemodynamic and metabolic profile in offspring of malignant hypertensive parents. *Hypertension*;38(3 Pt 2):616–620.
23. Mamaghani, E. A., Hasanpoor, E., Maghsoodi, E., & Soleimani, F. (2020). Barriers to Medication Adherence among Hypertensive Patients in Deprived Rural Areas. *Ethiopian journal of health sciences*, 30(1).
24. Mann JF (2020). Choice of drug therapy in primary (essential) hypertension. <https://www.uptodate.com/contents/search>. Accessed Dec. 20., 2020
25. María J S, Elda K G, Anna K V, Oralia B, Antonio R, Ricardo G C, Gerardo Del Carmen P (2019). Knowledge and attitude towards patient adherence and barriers to adherence to hypertension public university. *Gac Med Mex*; 153(4):430-440.
26. McDonald HP, Garg AX, Haynes RB (2020). Interventions to enhance patient adherence to medication prescriptions: scientific review. *JAMA.*, 288:2868–2879.
27. Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nature Reviews Nephrology*, 16(4), 223-237.
28. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. (2008). Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich).*; 10: 348–354. Wiley Online Library PubMed Google Scholar
29. Morisky DE, Green W, Levine DM (2019). Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care*; 24: 67–74
30. Schober, D. J., Tate, M., Rodriguez, D., Ruppert, T. M., Williams, J., & Lynch, E. (2020). High blood pressure medication adherence among urban, African Americans in the Midwest United States. *Journal of racial and ethnic health disparities*, 1-11.
31. Skeete, J., Connell, K., Ordunez, P., & DiPette, D. J. (2020). Approaches to the Management of Hypertension in Resource-Limited Settings: Strategies to Overcome the Hypertension Crisis in the Post-COVID Era. *Integrated Blood Pressure Control*, 13, 125 .
32. Soliman, S. S., Guseman, E. H., Haile, Z. T., & Ice, G. (2020). Prevalence and determinants of hypertension unawareness among Egyptian adults: the 2015 EHIS. *Journal of human hypertension*, 1-8 .
33. Svarstad BL, Chewning BA, Sleath BL (2018). The brief medication questionnaire: a tool for screening patient adherence and barriers to adherence. *Patient Educ Couns*; 37: 113–24
34. Wolf, J., & Narkiewicz, K. (2018). Optimizing the management of uncontrolled/resistant hypertension. The importance of sleep apnoea syndrome. *Current vascular pharmacology*, 16(1), 44-53.