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AN ASSESSMENT OF MEDICATION ADHERENCE AMONG PATIENTS WITH CHRONIC DISEASES: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Medication adherence is a critical factor in the effective management of chronic diseases, significantly influencing patient outcomes and healthcare costs. Globally, it is estimated that only 50% of patients with chronic illnesses adhere to their prescribed treatment regimens. This challenge is exacerbated in developing countries, including India, where cultural, socioeconomic, and healthcare system-related barriers contribute to even lower adherence rates. Numerous studies conducted across India have reported varying prevalence rates of non-adherence, reflecting the complexity of managing chronic illnesses in diverse populations. Non-adherence to medication not only leads to worsening health conditions but also results in increased out-of-pocket expenditures for patients. These costs arise from additional outpatient visits, emergency interventions, and hospitalizations due to complications stemming from uncontrolled diseases. As the burden of chronic diseases continues to rise in India, understanding the prevalence and factors influencing medication adherence is essential for developing effective interventions. This study aims to evaluate the prevalence of medication adherence among patients with chronic diseases in a tertiary care hospital setting. By identifying the extent of non-adherence and the underlying factors, we hope to inform healthcare providers and policymakers about the urgent need for targeted strategies to enhance adherence and improve health outcomes in this vulnerable population. **Aim:** An assessment of medication adherence among patients with chronic diseases: A prospective observational study. **Methods:** A prospective observational study was conducted involving 150 patients diagnosed with chronic diseases including Hypertension, DM, Asthma and COPD. Data were collected from medical case sheets, including demographic details, diagnoses, comorbidities, and medication usage. The Morisky Medication Adherence Scale was used to measure adherence and self-assessed questionnaire was employed to identify the predictors of poor adherence. **Result:** A total of 150 patients were analyzed, in which 80 male patients (53.30%) and 70 female patients (46.70%). The study population was categorized by diagnosis: HTN, COPD/Asthma, and DM with 50 cases (33.33%) in each category. In which, 129(86%) patient was non-adherent and only 21(14%) was adherent to drug. we found that 13(10.08%) of patient had high medication adherence, 43(33.33%) with medium adherence and 73(56.59%) with low adherence. According to the study forgetfulness was the main reason for the adherence i.e. 87(58%) of patients who forgot to take medication in the past, 35(23.33%) of the patient were careless in taking the medication and it was found that 43(28.67%) of the patient were not having the knowledge about the medication. In this study, regular follow-up percentage ratio of the patients were 84.7%, while 15.3% were not getting their follow-up done. **Conclusion:** Adherence is a key factor associated with the effectiveness of all pharmacological therapies but is particularly critical for medications used in chronic diseases. The reasons for poor medication adherence are often multifactorial. Patient education and motivation play significant roles in improving adherence. Additional research is needed to monitor medication adherence and identify factors contributing to this problem to provide successful strategies to improve medication adherence.

KEYWORDS: Medication adherence, Hypertension, Diabetes Mellitus, Asthma, COPD, MMAS-8.

1. INTRODUCTION

Medications constitute a fundamental component of the management of chronic diseases. However, adherence to long-term therapeutic regimens remains suboptimal. The World Health Organization (WHO) delineates adherence to long-term therapy as the degree to which an individual's behaviors—including medication intake, dietary compliance, and the implementation of lifestyle modifications—align with the recommendations established by a healthcare professional.[1] Adherence to

pharmacotherapy is an indispensable aspect of patient management and is vital for achieving clinical objectives. The WHO, in its 2003 report addressing medication adherence, asserts that "enhancing the efficacy of adherence interventions may exert a significantly greater influence on population health than any advancements in specific medical therapies." Conversely, non-adherence is associated with adverse clinical outcomes, heightened morbidity and mortality rates, as well as extraneous healthcare expenditures.[2] The complexities surrounding medication-taking behavior are both intricate and individualized, necessitating a plethora of multifactorial approaches to enhance adherence. Treatment → Adherence → Outcomes.[3]

Adherence serves as a pivotal determinant for the efficacy of all pharmacological interventions, but it holds particular significance for medications designated for chronic ailments.[4] The management of chronic diseases is frequently complicated by the simultaneous presence of numerous medical conditions, in addition to various social and psychological barriers.[5] The mean adherence rates observed in clinical trials can be notably elevated, attributable to the intensive focus on study participants and the selective nature of patient recruitment; nevertheless, even within clinical trials, average adherence rates are reported to range from 43 to 78 percent among individuals undergoing treatment for chronic conditions.[6] The World Health Organization (WHO) approximates that 50% of patients in developed nations fail to adhere to their medication regimens as prescribed.[7] In India, a multitude of barriers to adherence have been identified across the five dimensions of medication adherence as outlined by the WHO. This encompasses patient-centric factors, such as inadequate comprehension of both the illness and the treatment, which can be attributed to low levels of health literacy, alongside healthcare-related factors.

OBJECTIVES

Assessment of medication adherence in chronic diseases in an outpatient department in general medicine.
To assess the regular follow-up.
To track the medication chart.
To find out the most commonly prescribed drug used in antihypertensive, antidiabetic and anti-asthmatic drug.

- To assess the percentage of each drug used in antihypertensive, antidiabetic and anti- asthmatic drug.

2. MATERIALS AND METHODS

2.1 ETHICAL APPROVAL

The study was approved by the SDPC ethics committee and all the required documents were submitted including Case Report Form and Informed Consent Form. Approval number: SDPC/IEC/2023/04.

2.2 STUDY DESIGN

A prospective observational study was conducted at Venus Hospital from October 2023 to March 2024.

2.3 STUDY DURATION

The total duration of the study was six months from October 2023 to March 2024.

2.4 STUDY SUBJECTS

The Total of 150 patients enrolled in the study.

2.5 STUDY SITE

The study was conducted in an outpatient department of general medicine in the Smt. Rasilaben Sevantilal Shah Venus Hospital.

2.6 CRITERIA

INCLUSION CRITERIA

1) Data of individuals above 18 years of age were included.
2) Data were collected of both male and female genders.
3) Data of chronic disease patients with or without comorbidities were included.
4) Data of chronic disease patients in the Outpatient department were included.

EXCLUSION CRITERIA

1) Below 18 years of Age.
2) Patient shifted to another department.
3) Medico legal cases.
4) Surgical department.
5) Incomplete case file.
6) Mental retarded or challenged patient.

2.7 DATA COLLECTION FORM

The MMAS was used to measure adherence, and a self-assessment questionnaire identified predictors of poor adherence. Experts provided their feedback and opinions for improving the questionnaire, and their suggestions were incorporated into the final questionnaire. The questionnaire was initially designed in English, translated in Gujarati, by bilingual experts, and adapted for general use.

2.8 STATISTIC ANALYSIS

MS EXCEL was used to compile the data and analyze it for counts and percentages.

3. RESULT

3.1 Sociodemographic detail

The study population consisted of 150 patients, in which 80(53.30%) were male patients and 70(46.70%) were female patients included. In this study most of the patients were old age 46%, 40.67% were middle adulthood age and only 13.33% were adult. According to the data, 51(34%) patients were educated who has college degree, 99(66%) patients were uneducated. 45 (30%) patients were from rural area and 105(70%) patients were from urban area, maximum number of

patients were from urban area. The study population was categorized according to their diagnosis like HTN 50(33.33%), COPD/Asthma 50(33.33%) and DM 50(33.33%). Among 150 patients, 48(32%) had no comorbidities, while 102(68%) had at least one comorbidities. In this, 62 patients have single comorbidity while other 40 has more than one comorbidity. In single comorbidity patient, 17(27.42%) patients have IHD, 8(12.90%) has ALD, 3(4.84%) has Hypoglycemia, 6(9.68%) has CKD, 2(3.23%) has UTI and 12(19.35%) has Pneumonia, 6(9.68%) has seizure and 8(12.90%) has Anemia. In many patients, more than one comorbidity is present, like HTN + DM, DM + IHD, HTN + IHD, HTN + HYPERTHYROIDISM and others are as listed, in which highest number of patients 11(27.5%) are suffering from HTN + DM.

Table 1: Sociodemographic Details.

Sociodemographic detail	No of patients	Percentage
1) Gender Distribution		
Male	80	53.30%
Female	70	46.70%
2) Age group		
Old age (>64)	69	46%
Middle adulthood age (41-64)	61	40.67%
Adult (18-40)	20	13.33%
3) Education		
Educated	51	34%
Uneducated	99	66%
4) Residence		
Rural Area	45	30%
Urban Area	105	70%
5) Disease Categorization		
HTN	50	33.33%
COPD/ Asthma	50	33.33%
DM	50	33.33%
6) Comorbidity		
Yes	102	68%
No	48	32%
6(A) Single comorbidity		
IHD	17	27.42%
ALD	8	12.90%
Hypoglycemia	3	4.84%
CKD	6	9.68%
UTI	2	3.23%
Pneumonia	12	19.35%
Seizure	6	9.68%
Anemia	8	12.90%
6 (B) More than one comorbidity		
HTN + DM	11	27.5%
DM + IHD	9	22.5%
HTN + IHD	5	12.5%
IHD + Hyperthyroidism	3	7.5%
HTN + Hyperthyroidism	3	7.5%
HTN + Hypoglycemia	2	5%
UTI + UA	2	5%
HTN + DM + Pneumonia	1	2.5%
HTN + Pneumonia	4	10%

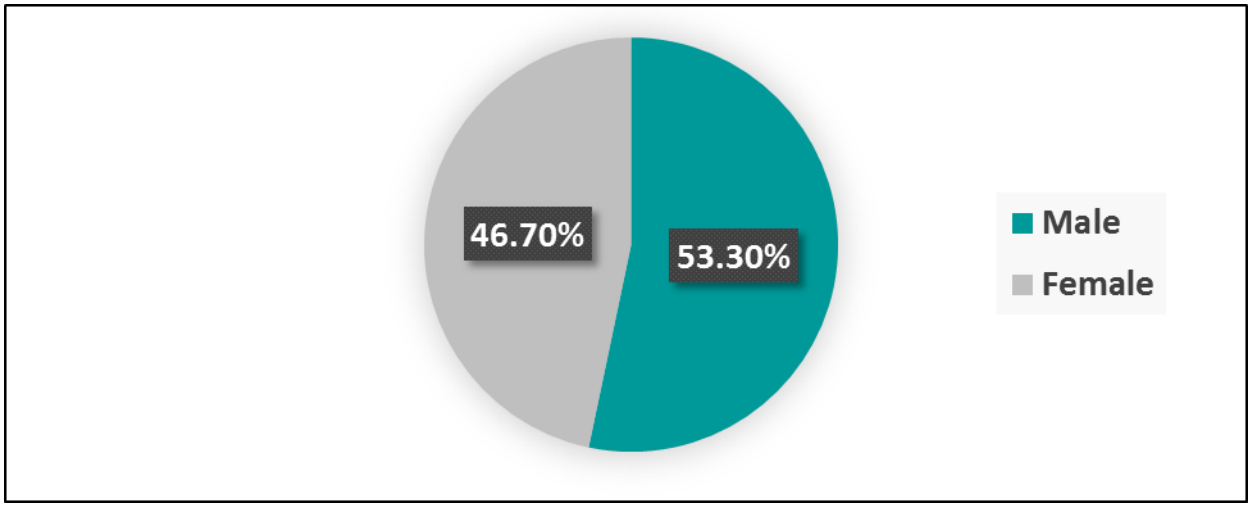

Figure 1: Pie chart representation of gender.

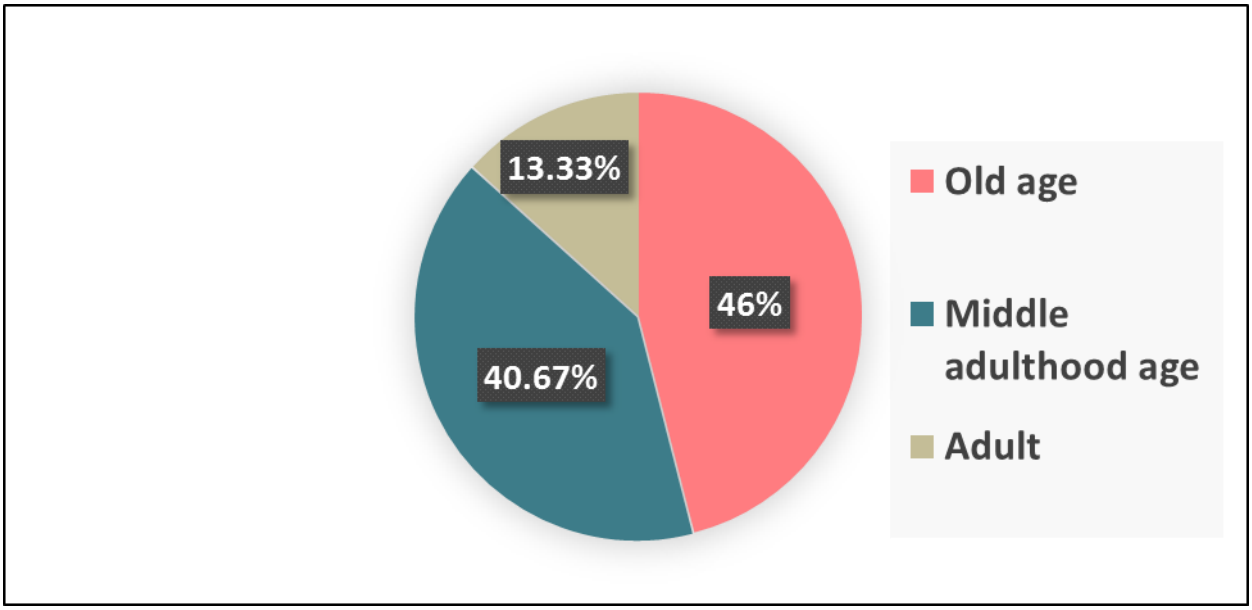

Figure 2: Pie chart representation of age group.

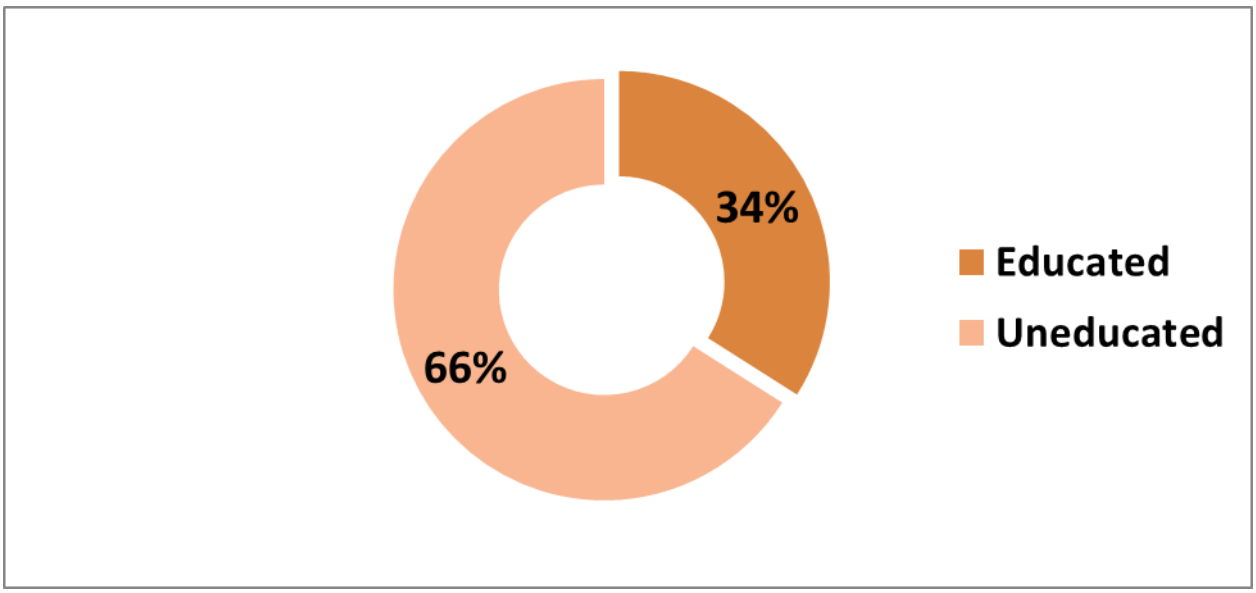

Figure 3: Pie chart representation of age group.

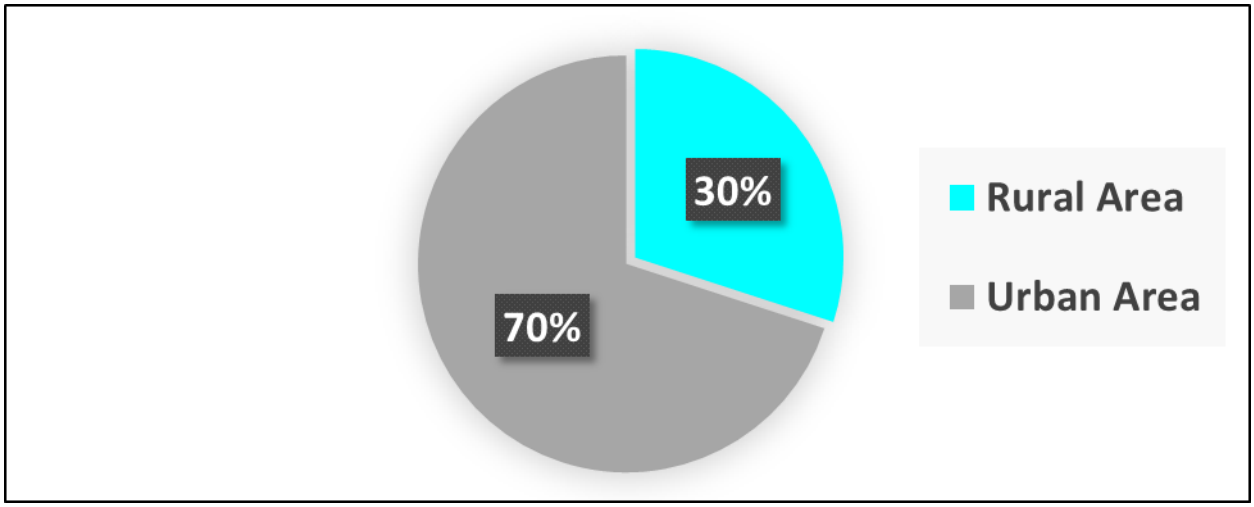

Figure 4: Pie chart representation of patient residence.

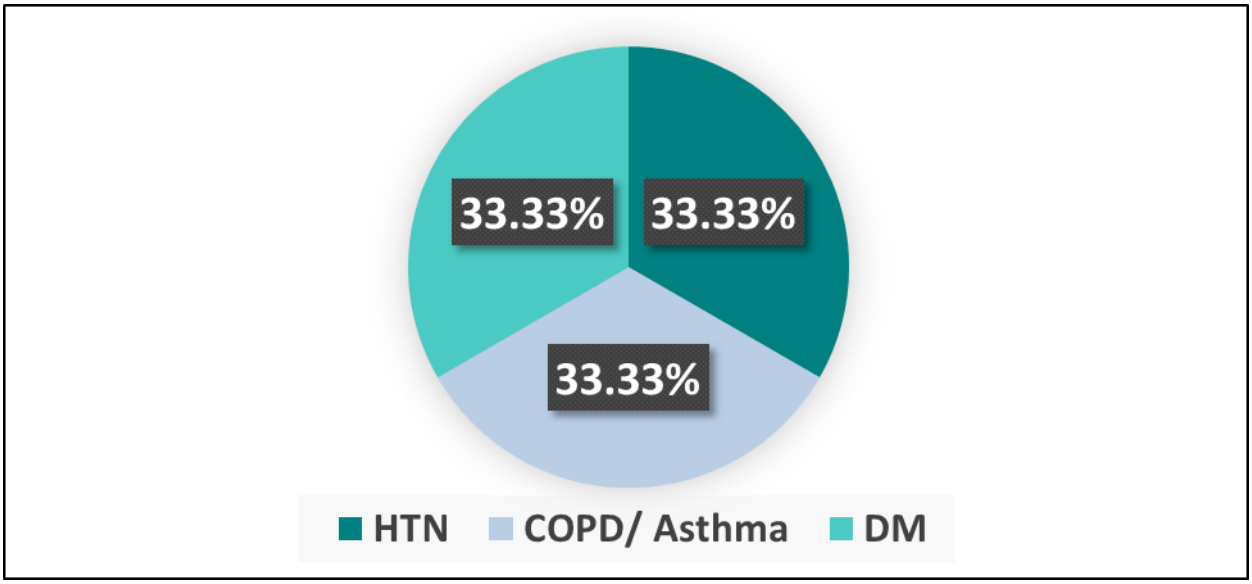

Figure 5: Pie chart representation of disease categorization.

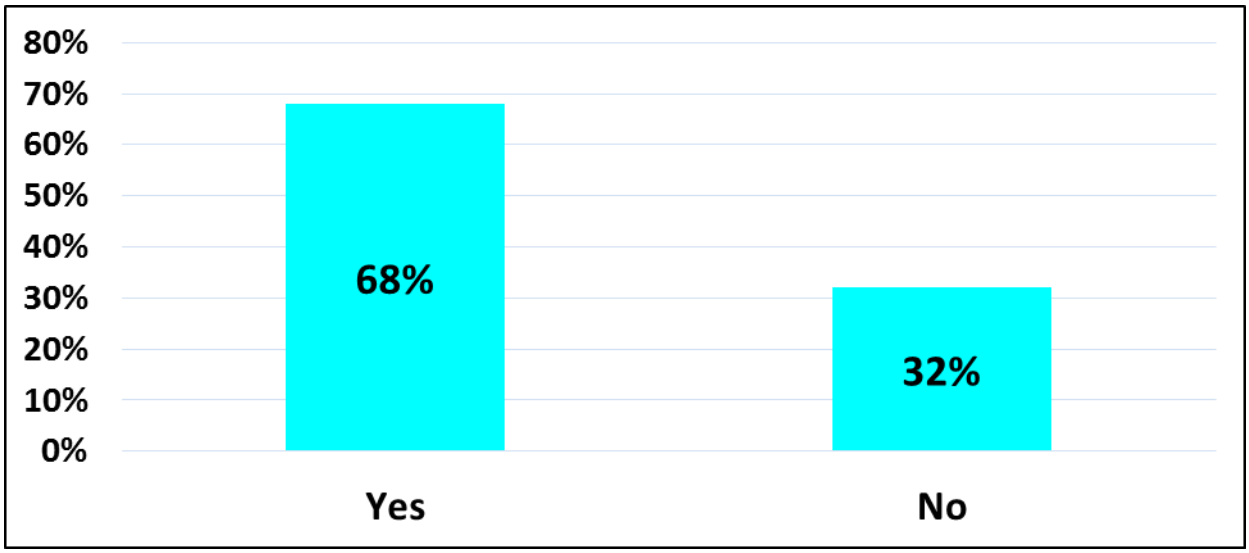

Figure 6: Column chart representation of comorbidity.

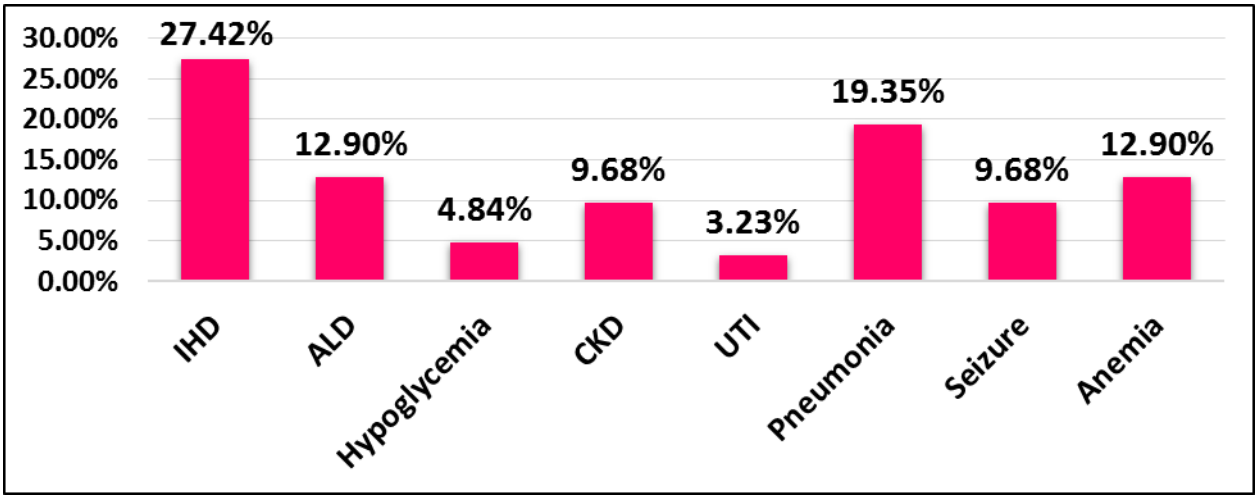

Figure 7: Column chart representation of single comorbidity.

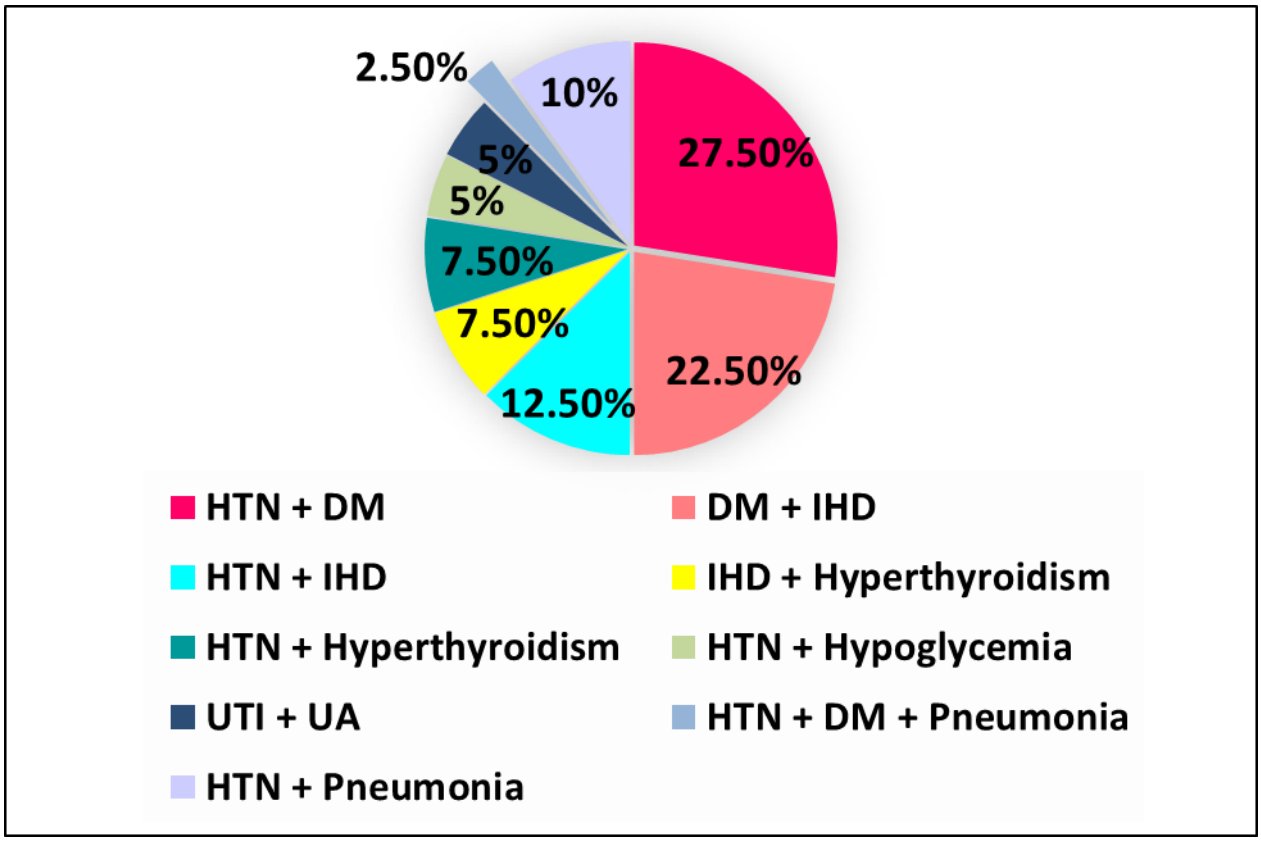

Figure 8: Pie chart representation of more than one comorbidity.

3.2 Treatment Analysis

In this study, the most prescribed class of antihypertensive drugs is angiotensin receptor blockers (ARBs) which is used in most of the patients. The most prescribed individual drugs are Telmisartan 32(23.36%) and Olmesartan 14(10.22%). Other commonly used classes of drugs are ACE inhibitors 5 (03.65%), Beta blockers 22(16.06%), Alpha blockers 4 (2.92%), CCB 32(23.36%), Diuretics 17(12.41%) and combination drug 1 (00.73%). The most prescribed class of anti-asthmatic drugs is bronchodilator. In which drugs used were Formoterol 2 (1.65%), Glycohale 6 (4.96%), Doxofylline 10 (8.26%), Levosalbutamol + Ipratropium Bromide 25 (21.67%), Levosalbutamol + Theophylline 2 (1.65%) and Etophylline + Theophylline 24 (19.83%). Other commonly used class of drugs are leukotriene antagonist 19 (15.70%), Corticosteroids 20 (16.53%) and combination drug 13 (10.75%). In this study, 106 antidiabetic drugs were used in patient. In which, 36(33.96%) DPP-4 Inhibitors, 4 (3.77%) SGLT-2 Inhibitors, 11 (10.38%) Sulfonylureas and 55 (51.89%) combination drugs used which are listed in table. According to the data, 41 (27.33%) takes only 1 to 2 drugs per day, 70 (46.47%) takes 3 to 5 drugs per day and 39 (26%) takes more than 5 drugs per day.

Table 2: Treatment Analysis.

Treatment analysis		
A) Antihypertensive drugs	**No of drugs (137)**	**Percentage**
1) ARBs	**46**	**33.58%**
Telmisartan	32	23.36%
Olmesartan	14	10.22%
2) ACE Inhibitors	**05**	**03.65%**
Ramipril	05	03.65%
3) Beta blockers	**22**	**16.06%**
Metoprolol	08	5.84%
Bisoprolol	08	5.84%
Propranolol	05	3.65%
Atenolol	01	0.73%
4) Alpha blockers	**04**	**2.92%**
Clonidine	04	2.92%
5) CCB	**32**	**23.36%**
Amlodipine	16	11.68%
Nifedipine	08	5.84%
Arkamin	08	5.84%
6) Diuretics	**17**	**12.41%**
Furosemide	06	4.38%
Spironolactone	10	7.30%
Torsemide + Sprironolactone	01	00.73%
7) Combination	**11**	**00.73%**
Amlodipine + Atenolol	11	00.73%
B) Anti-asthmatic Drugs:	**No of drugs (121)**	**Percentage**
1: Bronchodilator	**69**	**57.02%**
Formoterol	2	1.65%
Glycohale	6	4.96%
Doxofylline	10	8.26%
Levosalbutamol + Ipratropium Bromide	25	21.67%
Levosalbutamol + Theophylline	2	1.65%
Etophylline + Theophylline	24	19.83%
2: Leukotriene Antagonist	**19**	**15.70%**
Montelukast	19	15.70%
3: Corticosteroids	**20**	**16.53%**
Prednisolone	15	12.40%
Budesonide	5	04.13%
4: Combination	**13**	**10.75%**
Doxofylline + Montelukast	4	03.31%
Formoterol + Budesonide	5	04.13%
Ambroxol + Levocetirizine + Montelukast	4	03.31%
C) Antidiabetic drugs:	**No of drugs (106)**	**Percentage**
1: DPP-4 Inhibitors	**36**	**33.96%**
Teneligliptin	36	33.96%
2: SGLT-2 Inhibitors	**4**	**3.77%**
Dapagliflozin	4	3.77%
3: Sulfonylureas	**11**	**10.38%**
Gliclazide	6	5.67%
Glimepiride	5	4.71%
4: Combination	**55**	**51.89%**
Glimepiride + Metformin	15	14.15%
Glimepiride + Metformin + Pioglitazone	21	19.82%

D) Pill count		
Drug Taking/ Day	**No of patients (150)**	**Percentage**
1-2	41	27.33%
3-5	70	46.67%
More than 5	39	26%

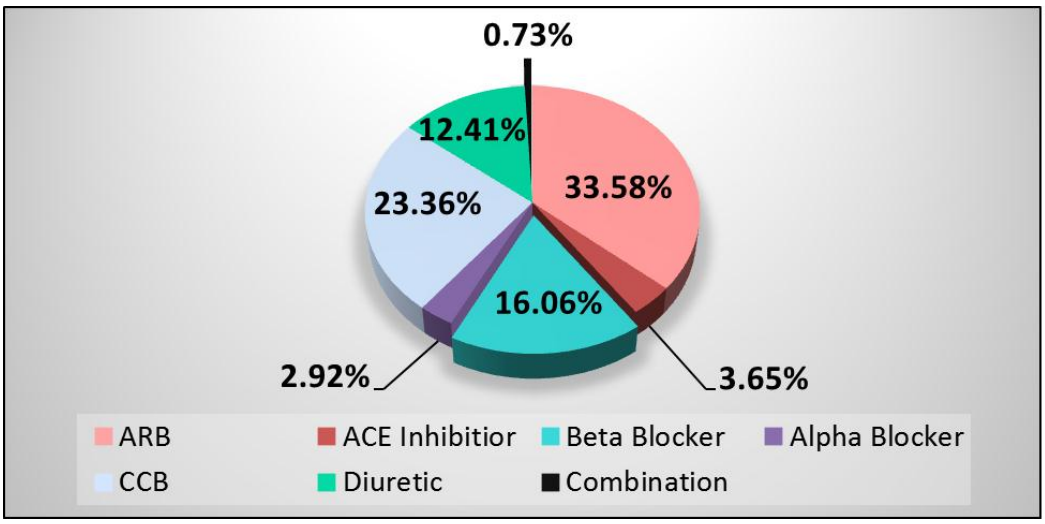

Figure 9: Pie chart representation of antihypertensive drugs.

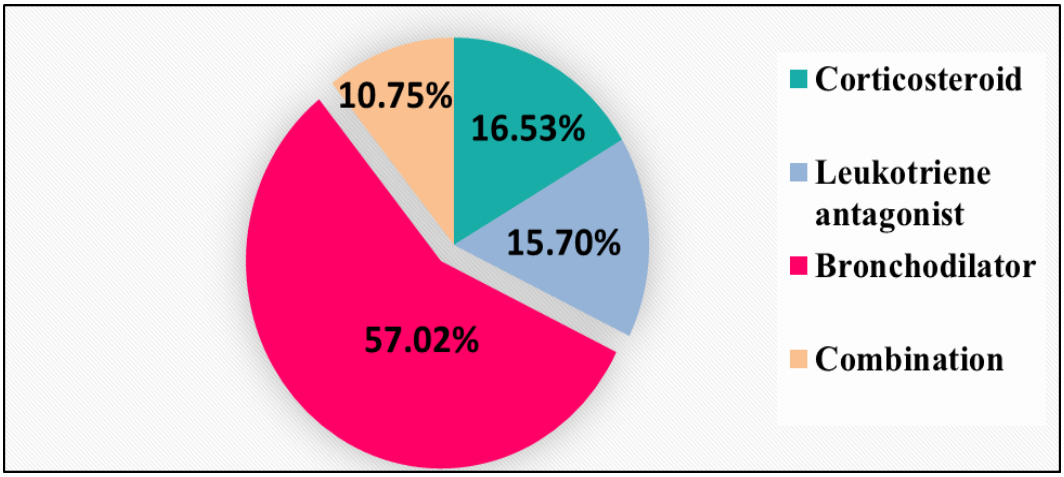

Figure 10: Pie chart representation of anti-asthmatic drugs.

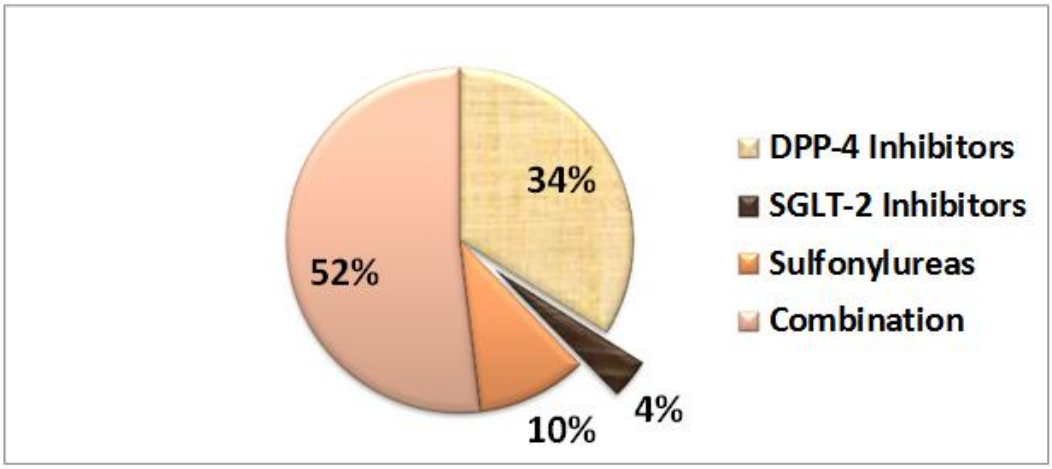

Figure 11: Pie chart representation of antidiabetic drug.

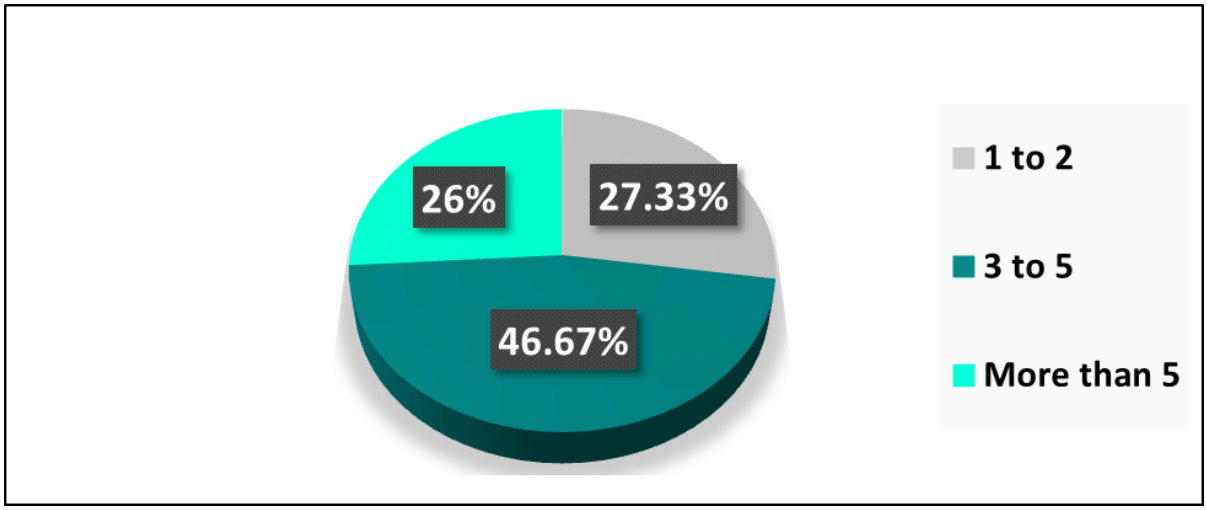

Figure 12: Pie chart representation of pill count.

3.3 Medication Adherence

In this study 150 patients included, in which 129(86%) was non-adherent and only 21(14%) was adherent to drug. we used MMAS-8 (Morisky Medication Adherence Scale-8) scoring system for medication adherence level, based on which we got information of adherence level, in which 13(10.08%) patients have high medication adherence, 43(33.33%) patients have medium medication adherence and 73(56.59%) patients have low medication adherence. In HTN, 5 patients have high, 11 has medium and 24 has low medication adherence. In DM, 3 has high, 16 has medium and 24 has low medication adherence. In COPD/ASTHMA, 5 has high, 16 has medium and 25 has low medication adherence. According to study forgetfulness is main reason of medication non-adherence. In this study, 87(58%) patients forget taking medication sometimes due to busy working schedule, a lot of medication and other reasons, 63(32%) are regularly taking medication, 35(23.33%) are careless in taking medication while 115(76.67%) are regularly taking the medication, 107(71.33%) has knowledge about their medication and 43(28.67%) in which most of the patients are of old age who has no knowledge about their medication. Other information is listed in above table.

The reason of medication adherence, 6(4%) patients who wasn't understand the instructions properly or forget the instruction, 8(5.33%) who has fear or occurrence of side effects, 19(12.67%) patients have a reason of lots of medication, 17(11.33%) patients suffering from chronic diseases for a long period of time, 45(30%) patient forgot to take medication in which most of the patients were old age, 21(16.67%) patients were too busy to take their medications on time or sometimes avoiding it, 25(16.67%) patients stop taking medication due to disappearing of symptoms or when they feel better and other 9(6%) patient have no specific reason for medication adherence.

In this study, 127(84.7%) patients were doing regular follow-up with doctor while 23(15.3%) were not doing regular follow-up.

Table 3: Medication adherence.

1) Medication Adherence			
Adherence	**Number of patients (150)**	**Percentage**	
Non-adherent	129	86%	
Adherent	21	14%	
2) Adherence level in non-adherent patient with disease			
Disease	**No of patients (129)**	**MMAS-8 Score & Adherence level**	
		8 (High)	**6 to 7 (Medium)**	**Below 6 (Low)**
HTN	40	5 (12.5%)	11 (27.5%)	24 (60%)
DM	43	3 (6.98%)	16 (37.21%)	24 (55.81%)
COPD / Asthma	46	5 (10.87%)	16 (34.78%)	25 (54.35%)
3) Level of medication adherence among the participants			
Information		**Yes**	**No**
1 Do you ever forget to take your medication?		87	63

	58%	42%
2 Are you careless at times about taking your medication?	35 23.33%	115 76.67%
3 When you feel better, do you sometimes stop taking your medication?	25 16.67%	125 83.33%
4 Sometimes if you feel worse when you take the medication, do you stop taking it?	119 79.33%	31 20.67%
5 Do you take your medication only when you are sick?	129 86%	21 14%
6 Have you ever increased the dose more than required?	21 14%	129 86%
7 Do you have proper knowledge about the medication that you are taking?	107 71.33%	43 28.67%
8 Do you think that by staying on the medication, you can prevent getting sick?	38 25.33%	112 74.67%

4) Reasons of medication adherence:

Reasons	**No of patients (150)**	**Percentage**
Not understanding the instructions	6	4%
The occurrence of side effects	8	5.33%
A lot of medication	19	12.67%
Long duration of treatment	17	11.33%
Forget to take the medication	45	30%
Too busy to take the medication	21	14%
Symptoms disappeared or feel better	25	16.67%
No specific reason	9	6%

5) Follow-up

Information	**Yes**	**No**
Are you doing regular follow-up with physician?	127 84.7%	23 15.3%

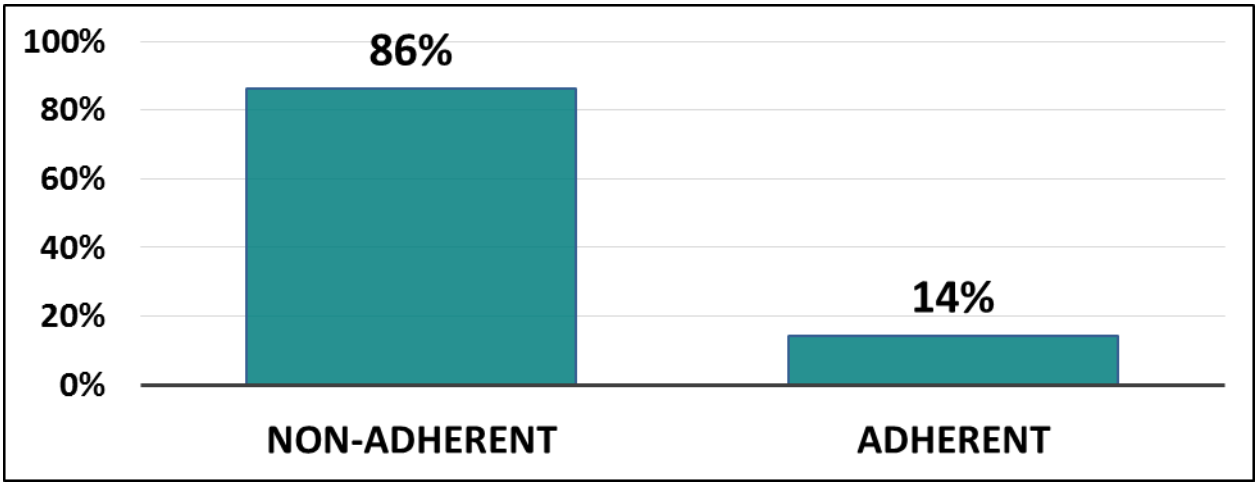

Figure 13: Column chart representation of adherence.

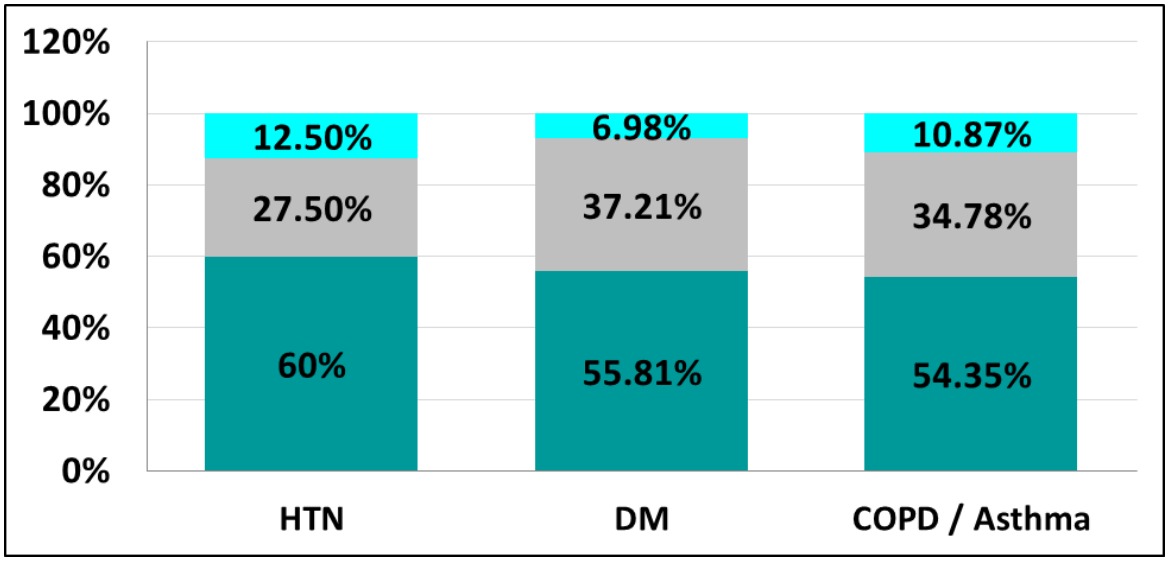

Figure 14: Column chart representation of adherence level in non-adherent patient with disease.

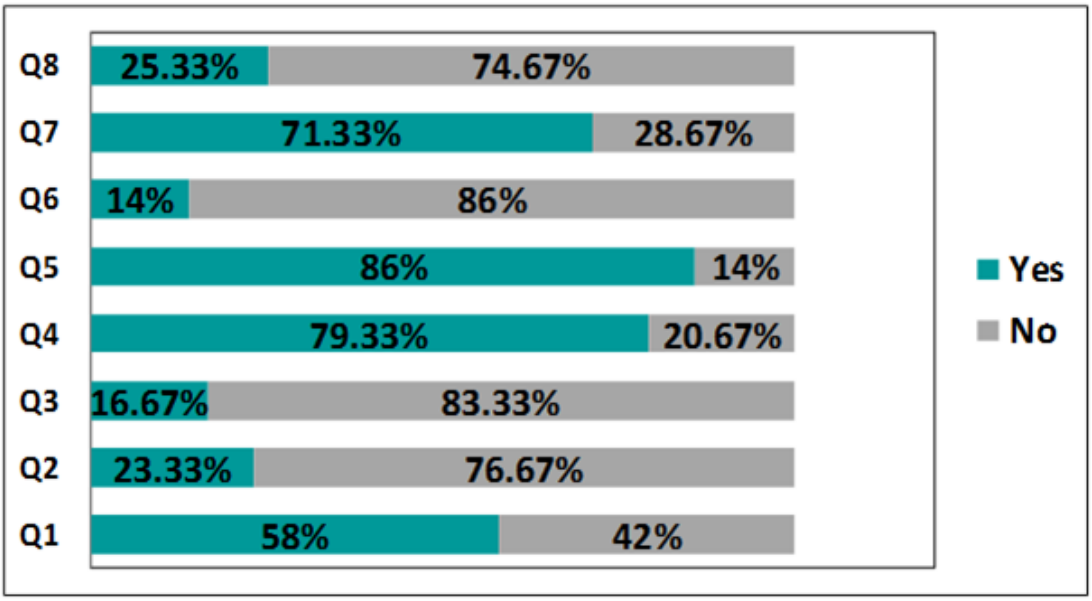

Figure 15: Bar graph representation of Level of medication adherence among the participants.

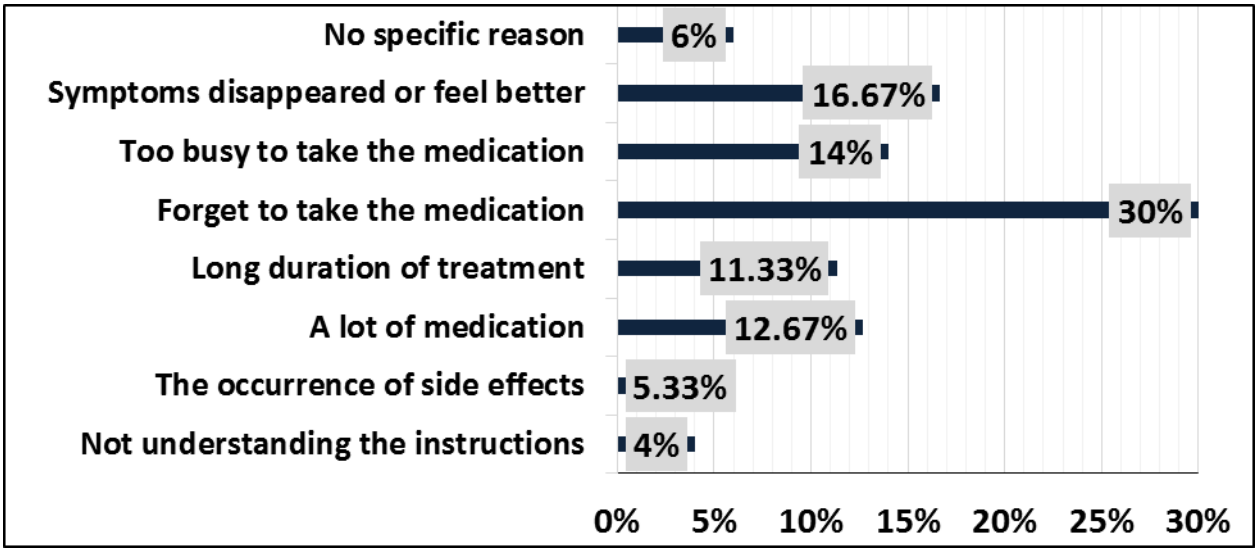

Figure 16: Bar graph representation of reason of medication adherence.

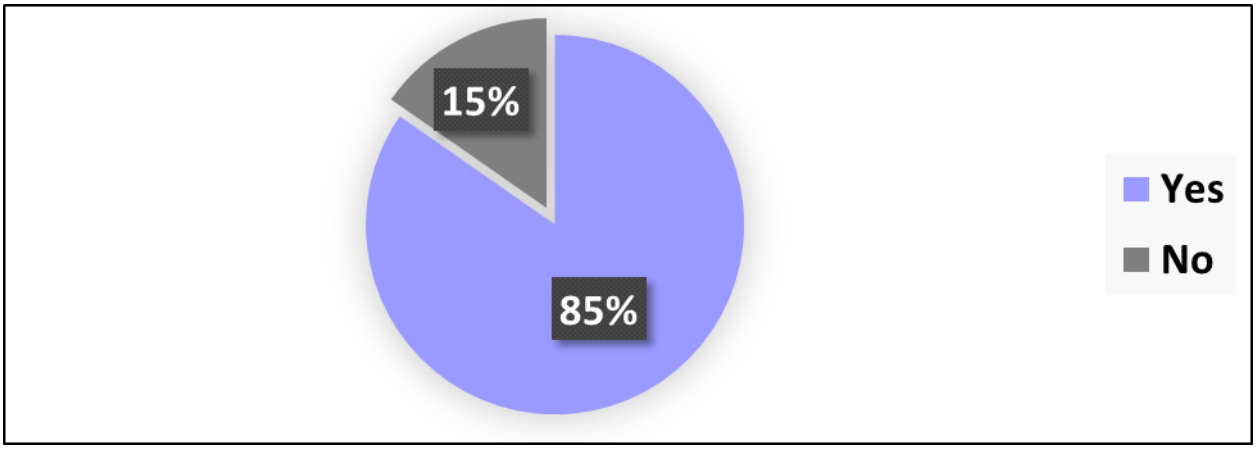

Figure 17: Pie chart representation of follow-up.

4. DISCUSSION

Medication adherence remains a major public health concern and is expected to continue as the population ages and becomes increasingly reliant on self-administered medications. It is a critical element for chronic disease management.

This study determined the level of medication adherence in some common chronic ailments. The comparison of adherence with similar studies conducted in various countries is difficult because of differences in patient characteristics and data collection tools.

Our study was designed as a prospective observational study and we included the data of 150 patients within the duration of October 2023 to March 2024. The study was concluded to observe the medication adherence among patients with chronic illness. In our study we included patient above 18 years, both men and women and patient with or without comorbidities. Total number of patients included in the study were 150.

In this study the ratio of male patient was high with 53.30% in compare to females, the maximum number of patients were between the age group of 71-80 years, the social history showed 12% of patient with smoking. The data showed 66% of patients who were uneducated, and maximum were from urban area i.e.; 70%. The study population was categorized according to the diagnosis which included HTN, COPD/Asthma, and DM with equal number of cases (50 each) and 68% of the patients were present with comorbidities (IHD with 27.42% and HTN+DM with 27.5%).

In this study the treatment analysis was categorized with the highest class of drug prescribed to the patients. For HTN, the most prescribed drug class was ARBs (Telmisartan and Olmesartan) with 33.58%. For Asthma, the most prescribed anti-asthmatic class was Bronchodilators (Formoterol, Glycohale, Doxofylline, Levosalbutamol + Ipratropium Bromide, Levosalbutamol + Theophylline, Etophylline + Theophylline) with 57.02%. For Diabetes, the most prescribed drug class was DPP-4 Inhibitors (Teneligliptin) with 33.96%. According to the data outcome 46.47% of the patients were taking 3-5 pills per day.

In this study, we used MMAS-8 (Morisky Medication Adherence Scale-8) scoring system to identify the medication adherence level. In which, 129 patients were non-adherent and only 21 were adherent to drug. we got 10.08% of patient with high medication adherence, 33.33% with medium adherence and 56.59% with low adherence. According to the disease the adherence level for HTN was 12.5% (high), 27.5% (medium) and 60% (low). For DM, the adherence was 6.98% (high), 37.21% (medium) and 55.81% (low). For COPD/Asthma the adherence was 10.87% (high), 34.78% (medium) and 54.35% (low). According to the study forgetfulness was the main reason for the adherence i.e. 58%, who forget taking medication on time due to some work, 23.33% of the patient were careless in taking the medication, 25(16.67%) patients stops taking medication when they feel better, 119(79.33%) patients stops taking medication when they feel better and 31(20.67%) were regularly taking which has increased risk of side effect of drug, 129(86%) patients takes medication when they are sick or if any problem but 21(14%) takes it regularly, 21(14%) were increasing the dose of drug when required without informing the doctor and it was found that 71.33% of the patient were having the knowledge about the medication and 38(25.33%) patient believed that by staying on medication they could prevent from getting sick.

In this study regular follow-up percentage ratio of the patients were 84.7%, while 15.3% were not getting their follow-up done.

The reason of medication adherence, 6(4%) patients who doesn't understand the instructions properly or forget the instruction, 8(5.33%) who has fear or occurrence of side effects, 19(12.67%) patients has a reason of lots of medication, 17(11.33%) patients suffering from chronic diseases for a long period of time, 45(30%) patient forget to take medication in which most of the patient are of old age, 21(16.67%) patients were too busy to take their medications on time or sometimes avoiding it,

25(16.67%) patients stop taking medication due to disappearing of symptoms or when they feel better and other 9(6%) patient has no specific reason for medication adherence.

5. CONCLUSION

Medication adherence is crucial for the effectiveness of all pharmacological therapies, especially in chronic diseases. The reasons for poor medication adherence are often multifactorial. The present study found a relationship between gender, age, literacy, complexity of the drug regimens and medication adherence. This study concluded that the overall medication adherence in chronic patients is low. Failure to adhere is a significant problem that affects not only the patient but also the healthcare system. Barriers to adherence include patient, provider and health system factors, with connections among them. Determining the barriers for each patient and implementing appropriate techniques to overcome them will be needed to improve medication adherence. Patient education and motivation play significant roles in improving adherence. Healthcare professionals must implement effective strategies to improve medication adherence and enhance therapeutic outcomes. In conclusion, additional research is needed to monitor medication adherence and identify factors contributing to this problem to provide successful strategies to improve medication adherence.

ABBREVIATION

- HTN: Hypertension
- IHD: Ischemic Heart Disease
- COPD: Chronic Obstructive Pulmonary Disease
- DM: Diabetes Mellitus
- UTI: Urinary Tract Infection
- UA: Unstable Angina
- ACE: Angiotensin Converting Enzyme
- CCBs: Calcium Channel Blockers
- SGLT-2: Sodium Glucose Transport Protein 2
- MMAS-8: Morisky Medication Adherence Scale-8
- ALD: Alcoholic Liver Disease
- ARBs: Angiotensin Receptor Blockers

AUTHOR'S CONTRIBUTION

Nidhi Chauhan, Hamida Araf, Meet Patel and Fezal Shaikh for designing and conducting the study, analyzing data, interpreting the results and drafting the manuscript.

Dr. Pallavi K.J. and Dr. Surbhi Chitania supervised the study and its critical review. All the authors gave the final approval of the version to be published.

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