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Assessing Medication Adherence in Patients with Diabetes and Hypertension: Challenges and Opportunities

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Abstract: ***Objective: This prospective study aims to assess medication adherence in patients with diabetes and hypertension, identify barriers to adherence, and determine factors influencing adherence to improve patient outcomes and provide insights for effective interventions. Methods: A prospective study was conducted in the outpatient department at Parul Sevashram Hospital PSH. Patients with confirmed diagnoses of diabetes and hypertension were enrolled. Medication adherence was assessed using the MMAS - 8 questionnaire. Interventions were implemented to address barriers and improve adherence. Statistical analysis was performed to evaluate the impact of interventions on medication adherence. Result: 545 Patients having history and confirmed diagnosis of Diabetes & Hypertension were enrolled. Among them 32.1 % were Diabetic, 34.9 % were Hypertensive and 33 % were Diabetes + Hypertensive. Majority of the patients were male (67.7%), the mean age was 52.8 years ± 5.2 years. All the patients were analyzed based on MMAS - 8 score questioner along with medical and medication history assessment. Patients were intervened, counselled along with life style modification which was significantly and statistically enhanced the extent medication adherence. Female and urban patients showed higher rates of adherence. Adherence was influenced by various factors, including cost of treatment, asymptomatic nature of the disease, age, educational status, socio - economic background, and residency. The study highlights the importance of multifarious interventions in improving medication adherence in patients with diabetes and hypertension. Conclusion: A multifarious intervention as well as counselling in a hospital setting escort to encourage refinement in medication adherence for patients current prescribed therapy. This study was significant as it sheds light on the challenges and opportunities related to medication adherence in patients with diabetes and hypertension. Understanding the factors that influence adherence can lead to the development of effective interventions, improve patient outcomes, and enhance the management of these chronic conditions. The intervention had significant impact on blood pressure control and blood glucose outcomes.***

Keywords: Assessment, Barriers, Modification, Medication adherence, Diabetes, Hypertension

1. Introduction

Cardiovascular diseases account for most NCD deaths or 17.9 million people annually, followed by cancers (9.3 million), chronic respiratory diseases (4.1 million), and diabetes (2.0 million including kidney disease deaths caused by diabetes). [1]Non - communicable diseases (NCDs) precisely Cardio – diabetic diseases were found to be the leading cause of mortality worldwide. [2]Morbidity, mortality, and disability attributable to major NCDs were discerption for almost 60% of all deaths along with 47% of the global burden of disease. [3]

The silent majority of deaths occur among low - and middle - income countries like India and China. [4]NCDs statement suggestive of approx.53% of all deaths in India and the chief contributor to intensifying burden of morbidity and mortality due to poor socio - economic control status of the patients. [5]Many factors contribute to the poor control status in patients with NCD which includes illiteracy, lack of integrated care at health system level, poor adherence to self - care recommendations, and compliance to medications. [6]Among these factors, medication non adherence is one of the general and potentially modifiable causes of inadequate control of the NCDs.

Globally, approx.50 % has been reported that full compliance in to the treatment prescribed for chronic illness which is far less in case of developing countries like India. [7]Many studies throughout India have reported varying prevalence of non adherence among patients with NCD. [8 - 10]Poor medication adherence results in increased healthcare cost due to outpatient care, emergency visits, and hospitalization for management of complications due to uncontrolled status.

Medication Adherence is defined by the World Health Organization as "the degree to which the person's behavior corresponds with the agreed recommendations from a health care provider." [11]Though the terms adherence and compliance are synonymously used, adherence differs from compliance. Compliance is the extent to which a patient's behavior matches the prescriber's advice. [12]Rate of adherence is usually reported as the percentage of the prescribed doses of the medication actually taken by the patient over a specified period. [13]Whereas adherence signifies that the patient and physician collaborate to improve the patient's health by integrating the physician's medical opinion and the patient's lifestyle, values and preferences for care. [14 - 15] Non - adherences is a very common phenomenon in all patients with drug - taking behavior. The complexity of adherence is the result of an

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interplay of a range of factors including patient views and attributes, illness characteristics, social contexts, access and service issues. [16 - 19]

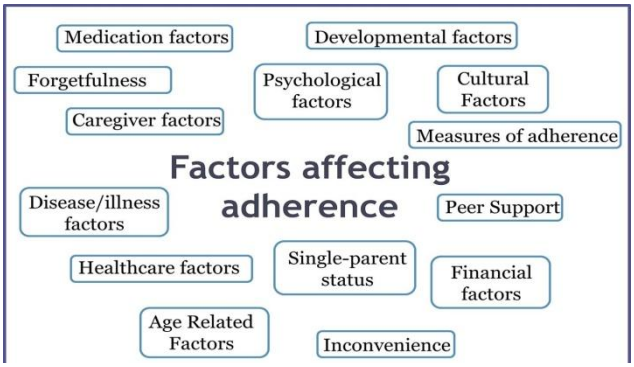

Figure 1: Factors affecting Medication Adherence

The consequence of non - adherence is waste of medication, disease progression, reduced functional abilities, and a lower quality of life, increased use of medical resources such as nursing homes, hospital visits and hospital admissions. Barriers to the effective use of medicines specifically include poor provider - patient communication, inadequate knowledge about a drug and its use, not being convinced of the need for treatment, fear of adverse effects of the drug, long term drug regimens, complex regimens that require numerous medications with varying dosing schedules, 29 cost and access barriers. [20 - 21]

2. Material and Methods

An observational study was carried out in 545 patients of Parul Sevashram Hospital (PSH) during the period of 6 months after obtaining an approval from Institutional Ethics Committee. The data's were collected in the Patient Profile Form (PPF) for complete duration of therapy, the analysis made from the data was reported in predesigned forms which includes information such as patient demographic details (All vitals, weight, medical & medication history etc.) and required laboratory information (RBS, HbA1c, lipid profile etc.)

- Observation was carried out to find out the scope of the study in the Parul Sevashram hospital
- Relevant literatures were reviewed.
- Data collection form was designed.
- Data of the patients was recorded in Patient Profile Form and analysed for the role of (Study title After Confirmation)

Study Criteria

Inclusion criteria

1) Age about 18 - 65 years
2) BMI <35 kg/m^2
3) All patients having confirmed diagnosis of Diabetes and Hypertension since at least 6 month.

Exclusion criteria

1) Pregnant or planning to become pregnant and breast feeding females
2) Mentally ill or other psychological subjects
3) Subject who have a thyroid disorder
4) Subject who are on antineoplastic medication
5) Other co morbid disease which can interfere with study as per investigators discretion.

Biophysical estimations

1) Physical examination, all vitals
2) Height, weight along with all history

Materials Required

1) Morisky 8 - score Medication Adherence Assessment questionnaires
2) JNC 9Standard Hypertension guideline algorithm (2022).
3) WHO guidelines for Diabetes mellitus

Statistical analysis

The data was represented graphically in MS - Excel with median values.

3. Result

Overall 545 Patients having history and confirmed diagnosis of Diabetes & Hypertension were enrolled based on OPD visit. Among them 32.1 % were Diabetic, 34.9 % were Hypertensive and 33 % were Diabetes + Hypertensive. Majority of the patients were male (67.58%), the mean age was 52.8 years ± 5.2 years.

Table 1: Sociodemographic Characteristics of Patients

Socio - Demographic Characteristics		No. of Patients	Medication Adherence	
			Before counselling	After counselling (≥ 6 Month)
Gender	Male	368 (67.58%)	51.02%	69.38%
	Female	177 (32.47%)	48.93%	85.10%
Age category (in years)	18 - 45	135 (24.83%)	75.00%	88.89%
	45 - 60	256 (46.89%)	47.05%	66.18%
	> 60	154 (28.28%)	48.78%	78.05%
Education (class)	Illiterate	327 (60.00%)	42.53%	52.87%
	Educated	218 (40.00%)	81.03%	94.83%
Residency of patients	Urban	338 (62.07%)	74.44%	91.11%
	Rural	207 (37.93%)	43.64%	56.36%
Medication type	Oral	466 (85.52%)	63.71%	82.26%
	Injectable	79 (14.48%)	47.61%	71.47%
Disease conditions	Hypertension	192 (35.17%)	58.82%	82.35%
	Diabetes mellitus	176 (32.41%)	61.70%	80.85%
	HTN+DM	177 (32.42%)	60.47%	70.83%

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Medication adherence was 58.82% before counselling in Hypertensive patients and was increased by 82.35% after counselling. Similarly, adherence was 61.7 % in diabetic patients and same was rise up to 80.85%. Moreover, the combined i. e hypertensive & diabetic rate of adherence was 60.47% which was expanded up to 70.83 %.

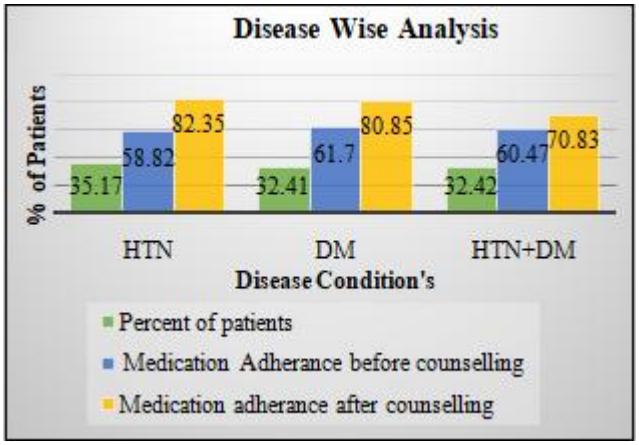

Figure 2: Analysis Based on Disease Conditions

All the patients were analyzed based on MMAS - 8 score questioner along with medical and medication history assessment. Patients were intervened, counselled along with life style modification which was significantly and statistically enhanced the extent medication adherence. Female patients had shown higher rate of adherence than male. Urban patients had shown higher rate of adherence as compared to rural patients.

Morisky - Medication Adherence Questionnaires (MMAQ's) Score:
In a prescribed therapy, adherence assessment of patients from the base line follow up to first follow up revealed a mean shoot up in medication adherence level of Male patient 0.52±1 & Female patient 0.45±1 and P<0.0001 which is statistically significant.

Second follow up of adherence shows a mean expand of Male patient 0.66 ± 1 & Female patient 0.9 ± 1 and P<0.0001 which is statistically significant.

Similarly, gender specific medication adherence on prescribed therapy was 0.53 in first follow up in males which was improved up to 0.65. In females adherence was 0.45 at first follow - up which was expanded up to 0.9

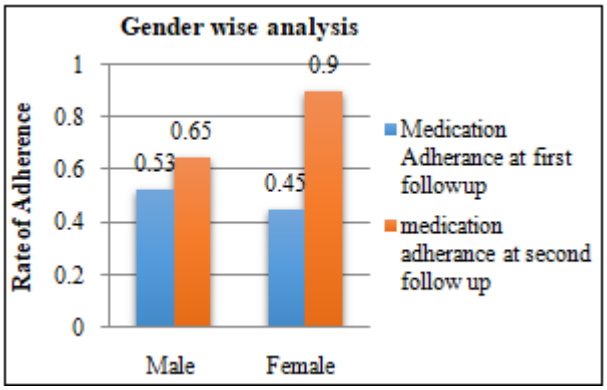

Figure 3: Gender Wise Analysis

Our results shown that therapeutic adherence was significantly influenced by different factors such as high cost of long term treatment for diabetes & hypertension, asymptomatic nature of the disease, age, educational status, socio - economic background and residency were the most common reason cited for not taking regular medications.

4. Discussion

Our current study shows a positive result on medication adherence. This was a facility - based prospective study conducted among patients with NCD attending a primary healthcare center in rural Vadodara city, Gujarat. The main objective of our study was to ascertain the prevalence of adherence and factors associated with it. Medication adherence was 58.82% before counselling in Hypertensive patients and was increased by 82.35% after counselling. The prevalence of low adherence to medications was found to be 25.4%, almost one fourth of study subject.

Similarly, adherence was 61.7 % in diabetic patients and same was rise up to 80.85%. Moreover, the combined i. e hypertensive & diabetic rate of adherence was 60.47% which was expanded up to 70.83 %. Elderly and female participants were found to have more chance being non - adherent to medications after adjusting for possible confounding variables. This study found that more or less one - third of the study participants were not adequately adherent to medications. An indistinguishable finding was found in a study done in Kerala by **Sankar UV, 2015** which reported 74% prevalence of non adherence. Nevertheless, findings similar to this study were reported by **Yusuff KB, 2008, Cramer JA, 2004** in other south Indian studies carried out in Andhra and Karnataka where almost one - third of the participants were non - adherent to prescribed medications.

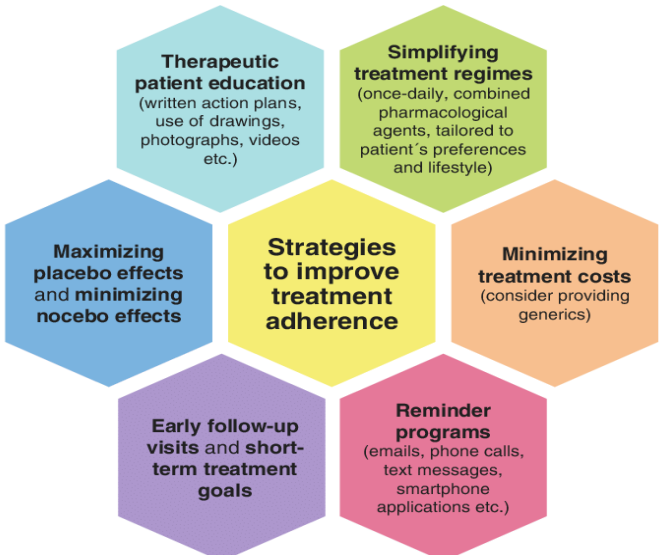

Figure 4: Strategies to Overcome Non - adherence

One of the crucial robustness of study was the use of validated scale to measure the medication adherence. Nonetheless, we could not get the exact pill count missed as the tool used to measure adherence has questions related to forgetfulness or carelessness and vantage point of the patients toward drug intake. Higher response rate (91.2 %)

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and investigate barriers to non adherence for multiple NCDs also add to the robustness of our study.

Adequate adherence to prescribed medications is indispensable for achieving better control status for patients with NCD. This needs to be ensured by family physicians and primary care physicians who provide healthcare services to a majority of patients with NCD in our country.

Possible Risk Due to Non - Adherence

High adherence to antihypertensive medications within 6 months post stroke was engaged with the overcome risks of both MACE and falls requiring hospitalization. Overall reduces CV events. Patients should be uplift to adhere to their antihypertensive medications to maximize post stroke outcomes. Furthermore, patient's adherence lead to good control of sugar level and improve quality of life.

5. Recommendations

Augmentation in drug intake should start from the patient level first. Patients need to be encourage enough to adhere to the prescribed drugs properly. Health education sessions targeting patients, family and community members can be conducted to discuss regarding the adherence in which one of the kingdom can be importance of adherence to medications.

Counseling for patients can be given at least in groups if not possible to give individually because of high case load or involve the medical persons nearby patients. However, supplementary research necessitate to be done by conducting interventional trial comparing the potency of individual counseling and group counseling for improving patient's drug adherence, to see whether they are equally efficacious.

6. Conclusion

This study reported that almost one - third of the study participants were non - adherent to medications prescribed. Elderly age group and female gender were found to be the determinants of nonadherence. A multifarious Physician's & Pharmacists intervention as well as counselling in a hospital setting escort to encourage refinement in medication adherence for patients current prescribed therapy with diabetes & hypertension. The intervention had significant impact on blood pressure control and blood glucose outcomes. Corrective measures necessitate to be started at patient level first by influence and educating them regarding the importance of drug intake by patients, family level and community level measures such as apprehension campaigns in the community and health education sessions at the clinic can be conducted. All these activities required to be coordinated at the health system level to achieve high adherence level among all the patients with prescribed therapy.

7. Limitation

The only limitation of this study were a single center study, less sample size, a single cross - sectional interview and few biochemical reports which was possibility not perfect. Our study used only two parameters i. e. Counselling and Life style modification, that was probably not enough reveals long standing inflammatory status, co - morbid disease and other medical conditions in the human body. Hence causal relationship between non adherence and factors associated cannot be determined accurately and Bias might be possible.

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Abbreviation

BMI	Body Mass Index
DM	Diabetes Mellitus
NCD	Non Communicable Disease
MMAS - 8	Morisky Medical Adherence Scale
JNC	Joint National Committee
WHO	World Health Organization
PPF	Patient Profile Form
RBS	Random Blood Sugar
OPD	Out Patient Department
HTN	Hypertension
DM	Diabetes Mellitus
CV	Cardiovascular
MACE	Major Adverse Cardiovascular Event
HbA1c	Haemoglobin A1c

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Conflict of Interest - No conflict

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