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The Impact of Medication Concordance in Type II Diabetes Patients in India Population

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Abstract: Now a day's diabetes is a major public health problem, that has already approaching epidemic proportions globally. Even though diabetes mellitus is recognized as a major chronic illness, the adherence to antidiabetic medicines has often been found to be unsatisfactory amongpatients with type 2 diabetes mellitus (T2DM).Diabetic medications improve glycaemic control, but more than half patients with diabetes do not achieve the expected target level of blood glucose. As a potential cause of poor glycaemic control, insufficient adherence to medication has long been discussed. The aim of the study was to investigate the clinical characteristics regarding adherence to antidiabetic medication in type 2 diabetes patients. A hospital based cross sectional study was conducted in theoutpatient department of Endocrinologyat a tertiary care hospital in Hyderabad, India from January 2023 to July 2023. Adult subjects, who were diagnosed with type 2 diabetes mellitus for at least 6 months, were interviewed using a pretested structured questionnaire to determine adherence to diabetic medications. A total of 504 patients were interviewed among which 296 are males and 209 are females. 80% are adherent and 20% non-adherent to the medication. Having comorbidities, high BMI, poor education and awareness contributed to increase the nonadherence.

Non-adherence to medication is a global phenomenon to be tackled at the earliest. Our study clearly brings out the importance of improving adherence by regular reminders as messages. Hence, there is a wide scope to avail means to improve the adherence pattern and maximize the health benefits.

Keywords: Adherence, Diabetes mellitus, glycaemic control

Introduction

Medication adherence is defined as "the degree to which the person's behaviour corresponds with the agreed recommendations from a healthcare provider". [1]Medication non-adherence is associated with reduced treatment effectiveness, decreased quality of life, increased healthcare utilisation, and costs. [2]Several factors contribute to non-adherence, which include healthcare costs, literacy, lack of awareness and inadequate family or community support. Multiple disease and polypharmacy among older adults are further challenges to medication adherence.[3]Lack of adherence to medication results in unfavourable outcomes and higher financial burdens.[4]There are about 62.4 million people with type 2 diabetes and about 77 million with prediabetes in India as per INDIA Diabetes report, which is likely to increase to 101 million by the year 2030.[5]The burden of diabetes is increasing worldwide, with overall increasing morbidity and mortality in developing countries.[6,7]

Most type 2 diabetes patients are treated with oral antidiabetic drugs (OAD's) and adherence to the medication is a key factor in patient management. [8]

Diabetes mellitus treatment is not only about controlling the patients blood glucose level, but also about preventing or inhibiting disease consequences and improving patient's quality of life. [9]

A key approach to the management of diabetes and prevention of complications is adherence to a healthy lifestyle and appropriate use of medication. [10]Thus,diabetics require lifelong treatment with medication and follow up. Adherence to antidiabetic medications improves glycaemic control, which in turn prevents complications and has a better prognosis. [11]Research hasindicated that providing pharmacist counselling in conjunction with brief motivational reminder messages helps enhance diabetic patient's knowledge, medication adherence, blood sugar management and HbA1C control. [12,13]

Not many studies have been conducted to explore adherence to diabetes medication in India. Thus, this study was undertaken.

Materials and Methods

A cross sectional study was conducted among consecutive patients attending the diabetes outpatient clinic at Apollo Hospitalbetween January to July(2023). The study was assessed in 504 type 2 diabetes outpatients. The study was performed in accordance to the Apollo hospitals and was approved by ethics committee. Informed consent form was obtained from every participant. Medication adherence was measured for every participant and subjectively on the same day they visited the clinic.

Population and Sample

The population of this study consisted of patients with diabetes mellitus who visited OPD.

Inclusion, exclusion Criteria:

The inclusion criteria of the research participants consisted of outpatients aged of more than 18 years who were diagnosed as having type 2 diabetes with or without complications receiving at least one oral antidiabetic drug for the last 6months and willing to participate in the study. Pregnant women and lactating mothers were excluded from this study.

Research instruments:

Data collection was carried out using informed consent demographic data collection sheets (age, gender, occupation and comorbidities), questionnaires and medical records (fasting blood sugar level).

The questionnaire consists of the domain of physical function, emotional function, social function, emotional state, physical condition, pain, vitality.

Statistical analysis:

All the data obtained was presented as mean and percentages in case of continuous and categorical variables, respectively. Initially tests of normality and Chi square test were done for all the continuous variables to compare statistical significance. For all statistical comparisons $p<0.05$ was considered statistically significant.

Results

Data Analysis

Among 504 patients size 104 patient were not adherent to the type II diabetes medication due to 5 major reasons. Forgetfulness, financial issues, adverse drug reactions, drug ineffectiveness and multiple medication are the reasons of being nonadherent.

Table 1: Reasons for non-adherence

Reasons	Percentage(%)
Forgetfullness	50.96%
Financial Issues	96%
Adverse Drug Reactions	17.3%
Drug Ineffectiveness	14.4%
Multiple Medication	16.3%

Table 2:Distribution of Study Population Based on Demographic Characteristics

A) Educational Qualifications

Education	**Percentage (%)**
Post-graduation	6(1.5%)
Graduation	323(64%)
Passed 10th	133(26%)
Not passed 10th	43(8%)

B) Gender

Gender	**Percentage (%)**
Male	296 (59%)
Female	209 (41%)

C)Age

Age (Years)	**Frequency (%)**
18-26	12(23%)
27-36	43(85%)
37-46	64(12%)
47-56	119(23%)
57-66	153(30%)
67-76	90(17%)
77-86	21(4%)

D) Marital status

Status	**Percentage (%)**
Married	494(98%)
Unmarried	11(2.1%)

Table 3:Distribution of study population based on history of missingmedication

History	**Percentage (%)**
Yes	104 (20.63%)
No	400 (79%)

Table 4:Common reasons for missing medications by those who reported to have missed taking their medications

Reasons of missing	Total 104
Forgetfullness	53 (50%)
Financial issue	7 (6.7%)
Adverse drug Reactions	18(17%)
Drug ineffectiveness	9(8.6%)
Multiple medication	17(16%)

Table 5:Level of Non-adherence based on the demographic characteristics and their associations

A) Age

Age	High, n (%)	Medium n(%)	Low n(%)	Total
18-26	1 (1.2%)	0 (0.2)	0(1%)	1
27-36	0 (8.4%)	1(1.7%)	6(6.7%)	7
37-46	4 (22.8%)	4(4.6%)	11(8.3%)	19
47-56	8(37.3%)	4(7.5%)	19(29.8%)	31
57-66	4(36.1%)	4(7.2%)	22(28.8%)	30
67-76	1(18%)	4(3.6%)	10(14.4%)	15
77-86	0(1.2%)	0(0.2%)	1(1%)	1

B) Gender

Gender	High n (%)	Medium n (%)	Low n (%)	p
Female	7 (67%)	6 (5.7%)	27 (25%)	
Male	11 (10%)	11 (10%)	42 (40%)	0.957

C) BMI

BMI	High n (%)	Medium n (%)	Low n (%)	P
18.5-24.9 (N)	6	4	29	
25-29.9 (OW)	10	8	28	0.434
>=30 (OB)	2	5	12	

D) Education

Education	High n (%)	Medium n (%)	Low n (%)	P
Not passed 10th	3	4	8	
Passed 10th	9	5	17	
Graduate	6	8	43	0.128
Post graduate	0	0	1	

E) Comorbidities

Comorbidities	High n (%)	Medium n (%)	Low n (%)	P
HTN	8 (79.3%)	8 (15.9%)	50 (63.5%)	0.165
CKD	1 (12%)	4 (2.4%)	5 (9.6%)	
MI	3 (16.8%)	1 (3.4%)	10 (13.5%)	
CVA	1 (4.8%)	2 (1%)	1 (3.8%)	

F) HbA_1C

HbA_1C	High n (%)	Medium n (%)	Low n (%)	P
< 5.7 (N)	0	0	2	0.617
5.7-6.4 (PreDiabetes)	2	1	8	
>6.4 (Diabetes)	16	16	59	

Table 6: Level of Non-adherence based on the reasons for missing

Reasons for missing	High n (%)	Medium n (%)	Low n (%)	P
ADR	7 (21.6%)	2	9	0.246
Controlled Sugar levels	1(1.2%)	0	0	0.837
Drugs Ineffectiveness	4(10.8%)	0	5	0.447
Financial Issues	0(1.2%)	0	1	0.837
Forgetfullness	6(63.7%)	11	36	0.009
Multiple Medication	0(21.6%)	3(4.3%)	15(17.3)	0.246
Others	0(3.6%)	1(0.7%)	2(2.9%)	0.670

This study aims to find out the association between different identified risk factors and nonadherence to diabetic medication.

Of the 507 patients enlisted in this study 3 patients data is incomplete. Therefore, 504 patients formed the analytical sample for the current study. The characteristics of the participants are summarised in table 1. It was found that there was no statistical significant difference between men and women among the nonadherent population.

In this bivariate regression analysis, older agewas negatively associated with low medication adherence. Sex, BMI and comorbidities were examined but not associated with medication adherence significantly.
In univariate analysis, having any comorbidity, especially hypertension or having one or more comorbidities significantly increased the odds of poor medication adherence.
Majority of the study participants had a history of missing their medications. The most common reasons for missing medications were forgetfulness, familial status, multiple medications, drug ineffectiveness and financial issues.

Discussion

The practice of medicine is attaining complex dimensions in the modern world. Patients prefer to take a drug less often and are accordingly, more adherent when their treatment regimen aligns with their preferences. There is strong evidence to support a significantly higher rate of adherence to drugs taken once daily versus those taken multiple times per day for various conditions including bisphosphates (BPs) for osteoporosis, angiotensin converting enzyme inhibitors for hypertension and sulphonyl ureas for type 2 diabetes, among many others. [14] Diabetes differs from many other chronic conditions in that it currently requires very frequent self-monitoring and intervention. Accordingly, poor adherence levels in patients with T2D are associated with an increased risk of hospitalisation, complications, cerebrovascular diseases and death. [15] In a cross-sectional study on concordance, trust, and patient enablement, conducted in Pune, it was concluded that better concordance was associated with significantly enhanced patient enablement. [16] However more studies are required to establish concordance as a trusted approach, and particularly its facilitation in clinical practice. Type 2 diabetes mellitus is a major public health problem. It is one of the fastest increasing diseases worldwide.Informed consent form was given to the patients (or) patient attendees for their approval to participate in the study, data was collected using predefined survey through questionnaire.
In this study we found that 400 patients were adhering to the medication and 104 patients were non-compliant, the reasons for non-compliance were analysed.
The 104 patients were classified into age, gender, educational background, smoking status, comorbidities in which no. of times missing the medication in a week were considered.The reason for missing the medication was divided into forgetfulness, financial cost issues,adverse drug reaction, drug ineffectiveness, multiple medication.
Following are the few measures to overcome the reason of non-adherence of medication inType 2 Diabetes mellitus.

Forgetfulness can be resolved by keeping reminders on electronic devices like alarms,reminder charts etc.Adverse drug reaction, multiple medication is the second largest for non-compliance can beexplained by the physician.Drug ineffectiveness is also one of the reasons which can be solved by addressing patients concern.By establishing concordance, we can achieve successful treatment rates along with decreasingin the treatment cost and improvising patient quality of life.

Medication adherence continues to be a significant challenge in health care, and there is a shortage of effective interventions. In 2003, the World Health Organisation identified that only 50% of chronically ill patients take their medication as prescribed in developed countries. [17] Health literacy (HL) plays a more important role in medication concordance; it entails a better knowledge and understanding of the disease or condition such as delay in treatment and rise in health care expenses. [18] Studies indicate that patients HL has a direct relationship with the extent of medication adherence. Low HL is associated with issues such as increased use of emergency or tertiary care services. [19]

Conclusion: From our study,we conclude that the concordence to diabetic medication in type 2 diabetes is low in Indian populatin because of various reasons like lack of awareness and understanding the physician'sinstructions and having their own myth's and belief's on medication adherence. Hence there should be very good relation between the physian and the patient to build a medication free society.

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References

1. Jimmy B, Jose J (2011). Patient medication adherence:measures in daily practice. Oman Med J, 26:155-9.
2. Raum E, Kramer HU, Ruter G, et al (2012). Medication nonadherence and poor glycemic control in patients with type 2 diabetes mellitus. Diabetes Res Clin Pract.97(3): 377-384.
3. Venkatesan M, Dongre AR, Ganapathy K. A (2018). Community based study on diabetes medication nonadherence and its risk factors in Rural Tamil Nadu. Indian J Comminity Med. 43:72-6.
4. Ho PM, Bryson CL, Rumsfeld JS (2009). Medication adherence:its importance in cardiovascular outcomes. Circulation. 119:3028-35.

5. Khotkar K, Chudhari S, Jadhav P (2017). Assessment of medication adherence in type II diabetic patients a cross sectional study. MGM J Med Sci. 4:65-9.
6. Zimmet P, Alberti K, Shawn J (2001). Global and societal implications of the diabetes epidemic. Nature.414(6865):782-787.
7. Fowler MJ (2008). Microvascular and Macrovascular complications of diebetes. Clin Diabetes. 26(2):77-82.
8. Lam WY, Fresco P (2015). Medication adherence measures: An overview. BioMed Res Int. 217-47.
9. American diabetes association (2021). Diabetes care in the hospital: Standards of medical carein Diabetes. Diabetes care. 44(1): 211-220.
10. Melikian C, White TJ, Vanderolas A, Dezil CM, Chang E (2002). Adherence to oral antidiabetic therapy in a managed care organisation: A comparission of monotherapy, combination therapy, and fixed dose combination therapy Clin. Ther.24(3):460-467.
11. Sankar UV, Lipska K, Mini GK, Sarma PS, Thankappam R (2015). The adherence to medication in diabetic patients in rural Kerala, India. Asia Pac J Public Health.27:513-23.
12. Saputri GZ, Akrom. Muhlis M, Muthoharoh A, Efek Konseleing Mengunakan (2019). Brief counselling 5A Modifikasi Disectai Pesan motivational Faenasis Dalam Peningkatan Perilaku dan outcome Klinik Pasien Diabetes Mellitus dengam Hepertami Rawat Jalan di RSUD Panambaham Sonapati, Bantul. IJCP. 811.
13. Adikusuma W, Quiyasam (2008). Adherence level and blood sugar control of Type 2 diabetes mellitus patients who gets counselling and short messages Serve as reminder and motivation. Asian J pharm Clin res. 11(2):219.
14. Baryakova TH, Pogostin BH, Langer R, McHugh KJ (2023). Overcoming barriers to patient adherence: the case for developing innovative drug delivery systems. Nat Rev Drug Discov. 22(5):387-409.
15. Kim YY, Lee JS, Kang HJ, Park SM (2018). Effect of medication adherence on long-term all-cause-mortality and hospitalization for cardiovascular disease in 65,067 newly diagnosed type 2 diabetes patients. Sci Rep. 8(1):12190
16. Banerjee A, Sanyal D (2012). Dynamics of doctor-patient relationship: A cross-sectional study on concordance, trust, and patient enablement. J Family Community Med.19(1):12-9.
17. Kvarnstrom K, Westerholm A, Airaksinen M, Liira H (2021). Factors Contributing to Medication Adherence in Patients with a Chronic Condition: A Scoping Review of Qualitative Research. Pharmaceutics.13(7):1100.

18. Lihara N, Tsukamoto T, Morita S, Miyoshi C, Takabatake K, Kurosaki Y (2004). Beliefs of chronically ill Japanese patients that lead to intentional non-adherence to medication. J Clin Pharm Ther.29(5):417-24.
19. Atal, Balakrishnan Sadashivam, Shah Nawaz ahmed, Avik Ray (2019). Medication concordance in modern medicine- A Critical appraisal from an Indian Perspective. Journal of Family Medicine and Primary Care. 894: 1313 -1318.