A Community Based Study to Evaluate the Impact of Pharmacists Intervention in Improving Medication adherence by Identifying Barriers in type 2 Diabetic Patients

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ABSTRACT

Medication adherence is a critical factor in managing Type 2 diabetes, and non-adherence can lead to increased morbidity, mortality, and healthcare costs. This community-based study aims to assess the effectiveness of pharmacist interventions in identifying and addressing barriers to medication adherence among Type 2 diabetic patients.

A prospective interventional study was conducted over a period of 6-month in a community setting involving 100 Type 2 diabetic patients above the age of 18 from various Dakshina Kannada district locations. The Morisky Medication Adherence Scale (MMAS-8) and a research-constructed, pre-validated questionnaire were used to identify the barriers and evaluate the adherence among type 2 diabetes patients. After the interview, the participants received educational interventions such as patient information leaflets (PILs), the teach-back approach, and verbal counselling. The same individuals were questioned three months after the intervention to get post intervention data.The impact of pharmacist interventions on medication adherence and associated clinical outcomes was analyzed using appropriate statistical methods

Accordingto the study findings only a small percentage of the research sample's had adequate adherence to their medication regimen. Forgetting to take the prescription was shown to be the most prevalent reason, followed by poor knowledge, not having enough money and taking too many drugs.Following the pharmacist's assistance, adherence significantly improved i.e low adherence dropped from 56% to 11% and Good adherence increased significantly after the intervention, going from 16% to 35%.

In conclusion, Pharmacist interventions play a crucial role in enhancing medication adherence among Type 2 diabetic patients by identifying and addressing barriers. The study highlights the importance of integrating pharmacists into diabetes care teams to provide personalized support, education, and counseling to patients. This community-based approach holds promise for improving long-term health outcomes and reducing the economic burden associated with poorly managed Type 2 diabetes.

Keywords: Diabetes mellitus, Barriers, Interventions, Adherence, Medication regimen

I. INTRODUCTION

Diabetes mellitus is recognized as a disease of significant concern in India dueto itsrapidly rising prevalence as well as the reality that type 2 diabetes has become an epidemicacross the globe and that both its incidence and prevalence are rising. Diabetes prevalence inIndia increased from 7.1% in 2009 to 8.9% in 2019[1].

Adherence is a crucial element in the successful implementation of bothpharmaceutical and non-pharmacological methods, as well as in the effective management ofchronicillnesses.[2]Patient-related,socioeconomic,condition-related,healthsystem-related,andtherapy-relatedare thefiveaspectsthattheWHOhasrecognizedashavinga nimpactonadherence.Non-compliancewithdiabetesmellitustherapycanresultinp harmaceuticalwaste,thedisease worsening, impaired functioning, a poor quality of life, and a higherreliance onhealthcareservicesincludingnursinghomes,hospit alvisits,and admissions[3,4].

An important first step when addressing any

healthcare problem (medication nonadherence) is to identify and assess the factors which are leading to the non-compliance, so that interventions can be designed to minimize or remove these factors. The study focuses on identifying the barriers involved in medication adherence and thereby providing the interventions to overcome this impediment.

OBJECTIVE
☐ Toevaluatetheimpactofpharmacist'sinterventioninimprovingmedicationadherence by identifying barriersin patientswith type2diabetes mellitus.

METHODOLOGY
Study Design:
*   A prospective interventional study toevaluatetheimpactofpharmacist'sinterventioninimprovingmedicationadherence by identifying barriersin patientswith type2diabetes mellitus.

Study Site:
*   The study was conducted at Srinivas Institute of Medical Science and Research Centre, Mukka-574146

Study Duration:
*   The study was conducted for aduration of 6 months from March 2022 – August 2022.

Sample Size:
*   The sample taken for the study was 100.

Ethical Clearance:
*   The study protocol was approved by the Institutional Ethics Committee (IEC) of Srinivas Institute of Medical Science, Mukka, Mangaluru.

Study Criteria:
*   Inclusion criteria:Genderequalitywasmaintained.Boththegenderalreadydiagnosed diabetic patients with oral antidiabetic medications having age of more than 18 yearswere included
*   Exclusion criteria:Patients who were not willing to or unable to give consent to participate and iftheywereterminallyill, havingvisual andhearingimpairments wereexcluded from thestudy

Source of Data:
*   Data was collected using data collection form through direct interaction with the study subjects at their residences

Study Method:
*   **Preparation forthestudy**
Patient data collection forms, patient information leafletsdemonstrating

differentinterventionstoovercome barriers and thereby improvemedication adherencein patientswithtype2 diabetesmellituswasprepared.
*   **Obtaininginformedconsent**
Informedconsent formwillbeobtainedfromtheselectedpatient inEnglishandKannada.
*   **Patientcategorization**
Total MMAS-8 scores can range from 0 to 8 and have been categorized into three levels ofadherence: high adherence (score = 8), medium adherence (score of 6 to < 8), and low adherence(score< 6).
*   **Providingintervention**
After the collection of data (socio demographic data, knowledge, medication adherence score),patientinformationleaflets(PILs)wasprovidedfordiabeticpatientsinmediumadherencegroup, whereas for patients in low adherence group the patient information leaflets(PILs) wasprovidedalongwith patient counsellingusingteach back method.
*   **Posteducationalinterventionassessment:**
Diabetic patients who scored low and medium from MMAS, has been further considered for thestudy. The study design was divided into pre and post educational intervention, where the posteducational intervention assessment was done after 1 month using the same study questionnaireandMMAS-8.

DataAnalysis:
*   Data was analyzed using Social Science Statistics software. Association of gender with adherencewas done using student t-test. Karl pearson correlation was used to observe association of agewith adherence. Education level, employment status and duration of treatment was associatedwithadherenceusingonewayANOVAtest.

II.   RESULTS
The study was conducted in 100 patients, containing equal number of male (50%) andfemale (50%) participants. Out of 100 participants, 13 were belonged to the age group of 30-44years, 54 belonged to the age group of 45-60 years and 33 were above 60 years of age. Majorityof the participants (53%) had completed college level of education, 23 (23%) participants hadsecondary level of education, 12 (12%) had completed primary level of education and 12 (12%)were illiterate. 62 (62%) of the participants were

employed, (23%) were unemployed and 15(15%)wereretired.(Table1)

Table1:Demographicdetails ofthepatient

Demographiccharacteristics	Frequency (%)(N=100)
GenderMaleFemale	50(50%) 50(50%)
AgeGroup 30-44 45-60 60andabove	13(13%) 54(54%) 33(33%)
Employment Status EmployedUnemployed Retired	62(62%) 23(23%) 15(15%)
Levelof Education IlliteratePrimarySecondaryCollegeLevel	12(12%) 12(12%) 23(23%) 53(53%)

SOCIAL AND MEDICAL HISTORY

Out of 100 participants, 20 participants had history of alcohol consumption only, 9 participants had history of smoking and 8 had both. In the study group, 40 participants (40%) have been on medication for morethan 5 years; meanwhile 37 participants (37%) had treatment history of 1-5 years and 23 (23%) were on medication for less than one year. The social history and duration of treatment of the participants are depicted in Figure 1 and Figure 2 respectively.
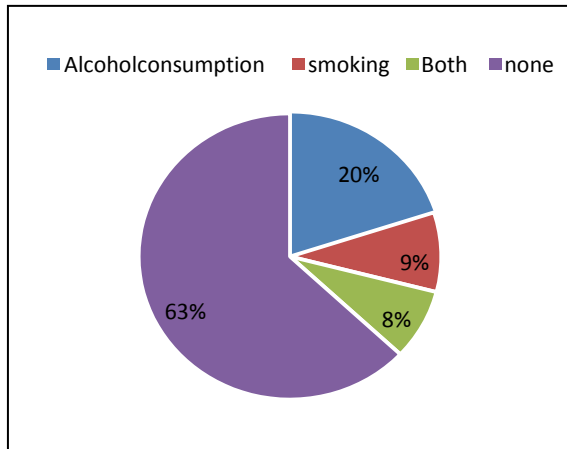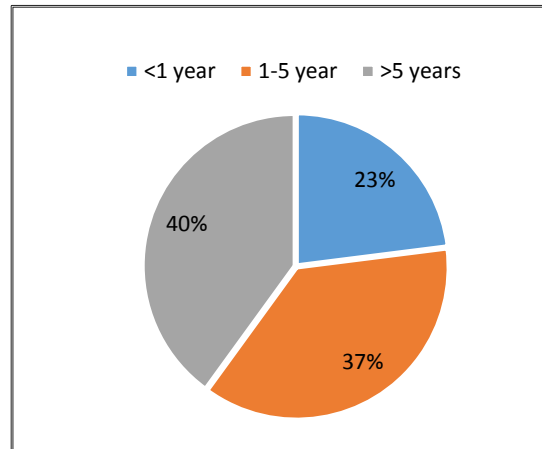
Figure1:Socialhistory

Figure2:Durationoftreatment

Assessmentofmedicationadherenceinpatientswith type2diabetesmellitus

Adherencepattern (pre intervention)

From the study population, mean score of MMAS-8 was found to be 4.69beforetheintervention.Majorityofparticipantswerefoundtohavelowadherence(56%).Thestudyrevealed that 16 (16%) participants had high adherence and 28(28%) had medium adherence.Theaverageadherencescoreforfemales was 3.855 whereasformales itwas 5.53

Adherencepattern(postintervention)

After the intervention, 35 subjects were classified into highly adherence group, 54subjects into medium adherence group and 11 subjects in low adherence group respectively.(Figure3).

Table2:DistributionofrespondentsonthebasisofMMAS-8Score

Category	Pre-test	Pre-test%	Post-test	Post-test%
Highadherence(=8)	16	16%	35	35%
Medium adherence(6-<8)	28	28%	54	54%
Lowadherence(<6)	56	56%	11	11%

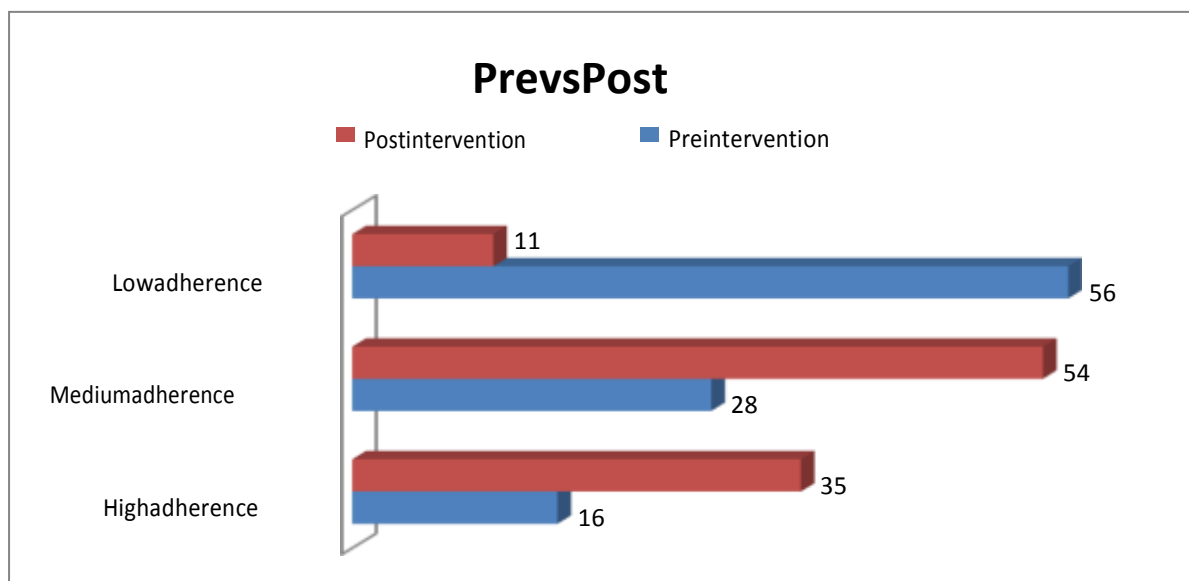**Figure3:proportion ofparticipantsaccordingtotheiradherence(pre vspost)**

Reasonsfornon-adherencetotheanti-diabeticmedication

The study also identified various reasons for non-adherence to the treatment. Out of 100participants the main reason was forgetfulness (41%)and lack of knowledge (41%). Another major cause for non-adherencetowards medication was high direct and indirect costs of treatment (15%), followed by multiplemedications (8%), whereas (6%) regarded to be due to travelling, followed by (4%) due to poorfollowup,(4%)duetosideeffects,about(2%)ofpatientsstoppedtakingmedicinesafterthey felt thatthere is an improvement in their health status.

Table3:ReasonsforNon-Adherence

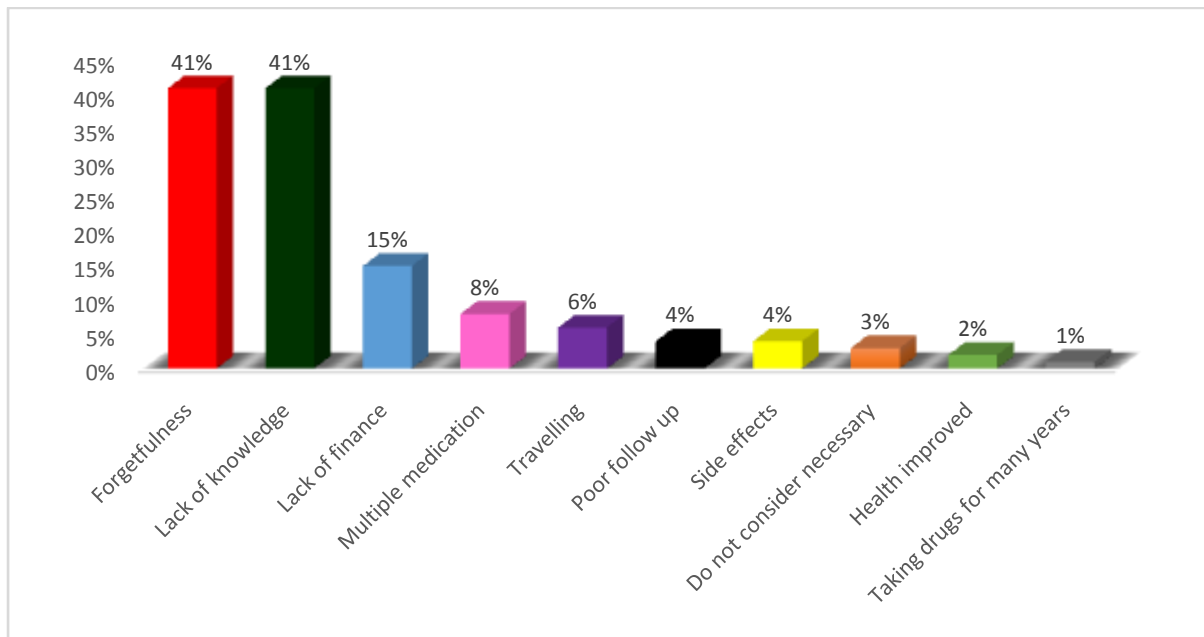| Reasonsfornonadherence	Number of participants	Percentage of participants
Forgetfulness	41	41%
Lack of knowledge	41	41%
Lackoffinance	15	15%
Multiplemedication	8	8%
Travelling	6	6%
Poorfollow up	4	4%
Sideeffects	4	4%
Do not considernecessary	3	3%
Healthimproved	2	2%
Takingdrugsformanyyears	1	1%

Figure 4: Reasons fornon-adherence

NullHypothesis:

According to this study, the null hypothesis was rejected since there was a relationshipbetween pharmacist intervention and improvement in medication adherence after identifying barriers in patients with type 2diabetes.

III. DISCUSSION

The preliminary study was conducted with the aim of assessing the socio-demographicprofile of patients withtheir adherence tomedication regimen as well as the barriers associated with adherence. The medium adherencegroup was educated with PILs and the low adherence group waseducated with the helpofpatient counselling andPILs, Pill box, Pill card, SMS alerts, medication adherence apps (Medicationreminder and tracker) with regard their barriers. The aim was to assess the impact of pharmacist intervention on theirmedicationadherence by identifying barriers.

Adherence to medication is the prior factor for the management of DM. A good clinicaloutcome is possible only with the eradication of barriers to adherence. In the study, MMAS-8 was used to assess themedicationadherence ofthesubjects.A pre-test was conducted to assess the Medication adherence in diabetic patients usingMMAS-8 and the results revealed that more than half of the subjects had low adherence.

According to this study, females were associated with low adherence which could beattributed to the fact that women in Dakshina Kannada were engaged in household work. Therewas significantassociation betweeneducationlevel and adherence (p<0.01). This associationwas brought about by the fact that education level has a beneficial impact on the amount ofinformationpatientswillhave,whichwillultimatelyresultingreatermedicationadherence.Many studies reported association between socio-demographic characteristics andadherence.**GebreTeklemariamDemozetal.,**foundthatpooradherencewasseeninfemalesandparticipantswithnoformaleducation[5].Theparticipantswithmorethan5yearsof treatment were found to be poorly adherent to their medications A study conducted in Malaysiaby **Zeinab Jannoo et al.,** revealed that patients who had low medication adherence level had alonger diabetesdurationof8.8yearscomparedwith thosein the otherlevels[6].

Forgetfulness was found to be the major reason for patients not adhering to their therapyin the study which could be associated with the increasing age of the patients as 39.02% of thepatients were above the age of 60. This result corresponded with a study done by **Lyndsay A.Nelson et al.,** where the most frequently reported barrier was forgetting to take medications[7].Forgetfulness was followed by Poor

knowledge of subjects regarding the disease,as 41% was categorized to have low level knowledge about diabetes.The study by **Ahmad et al.,** showed that for every one percent decrease in knowledge about the disease, treatment non-adherence had a 3.6-point increase[8]. The findings of the current study conform with results of study done by **Kassahun T. et al,.** have revealed that low level of knowledge of diabetes among participants is demonstrated to have poor adherence to medications[9].

Lack of financewhich could be linked to the employmentstatusofthepatients.Themajorityofindividualswhocitedfinancialconstraintsasabarriertomedicationadherencewereunemployedorretired,whichexplainedwhytheyhaddifficulty in affordingtheirprescribedmedications.Thiscoincided withthestudyconductedby**SmitaSontakkeetal.,**whichrevealedvariousfactorsthatleadtomedicationadherenceoutofwhich unawareness (55.66%), forgetfulness (50.66%) and high cost of the medication (43.33%) werethecommon causes ofnon-adherence[10].

Complex treatment regimen is one of the factor that contributes towards non-adherence. The number of drugs taken by patients depends on the severity of T2DM and comorbidities. According to a US survey, 50% of diabetic patients received prescription having more than seven medications. This included anti-diabetic drugs as well as other drugs to treat comorbidities[11]. Thus, the drug regimen for patients with diabetes mellitus can become complex, and adherence may definitely be a challenge for patients. Studies have previously demonstrated that patients with more than two medications were more likely to be non-adherent, especially the elderly[12], which could be correlated as 33% of subjects involved were elderly in this study. Travelling is observed as one of the barriers of medication adherence. This study revealed that 53% patients forgets to take medications while travelling, which is similar to the study done by **Venkatesan Metal.,**showedforgetting to take tablets during travelas the 2nd most reason for poor adherence[13].

Adherencetoprescriptionregimensisgreatly influencedbythephysician–patientrelationship.Lackofeffectivecommunicationbetweenthephysicianandthepatientmaycontribute to medication non- adherence.In a similar study, patients reporting poor patient-provider communication and dismissing attachment were significantly less likely to adhere to their medication and consequently had poorer glycaemic control[14]. General dissatisfaction with the quality of health services provided at a health facility is also a recognised barrier to medication adherence in patients who received care there[15]. Dissatisfied patients are also less likely to attend follow-up clinics and have little trust in the medication prescribed

Side effects were also one of the reasons for non-adherence in the current study which was in agreement with the study done by **MohammedArifullaetal**inwhichsideeffectsofmedicationtobeoneofthereasonsfornon-adherence[16].
Such barriers can be curbed by educating the patientsregarding the medications and how to tackle side effects of the medication. Nausea, vomiting, and diarrhea are some of the most common side effects of anti-diabetic medication which can be prevented by taking medicationwith a meal. Also, to help lessen the risk of severe diarrhea anti-diabetic medications are startedon low dose. Sometimes it could lead toanemia causing tiredness due to depletion of vitaminB12 which can be corrected by taking vitamin supplements. Hypoglycaemia is one of the majorsideeffects of antidiabetic medications which causes headache, sweating, fatigue, dizziness.Eating or drinking something that's mostly sugar or carbohydrates to raise the blood sugar levelquickly. Pure glucose available in tablets, gels and other forms is the preferred treatment. Whenpatients can clearly see how the prescribed medication is causing some beneficial and relativelyquick effects,theyaremoreinclined to stickto theirprescription regimens.

Another problem is that patients may feel cured and stop taking their medication because of lack of informationabout the consequencesofnon-adherence. Theresearch provided interventions to T2DM patients by counselling and informing to take medication regularly to prevent complications. The results of the study shows that interventions provided including pharmacist counseling, medication adherence app, and the patient information leaflets were effective in improving medication adherence in Type 2 diabetes mellitus patients.

IV. CONCLUSION
This study addressed medication adherence issues among thetype 2 diabetes patients and was able toassess that majority of type 2diabetes mellitus patients have suboptimal medication adherence.From the findings, the

forgetfulness, lack of knowledge, multiple medication, lack of finance, Poor follow up were the major reasons contributing to non-adherence. The variety of interventions to overcome these barriers were employed through patient information leaflets, which includedPill card, pillboxes, as well as the integration of new technologies like medication reminder mobile applications and medication SMS reminders/alerts.

In conclusion, the pharmacists can have a huge impact on patientsadherence to medication. They can adopt a strategic approach to adherence discussions. The collection of information, the development of a cooperative connection, the usage of open-ended questions, the promotion of education, and the eradication of obstacles are all crucial first steps. Health professionals should be willing to develop and implement potentially effective means to achieve this.

V. ACKNOWLEDGEMENT

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