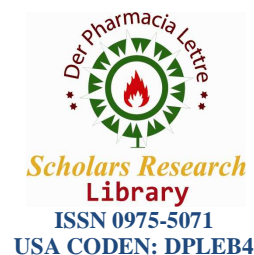




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## Intervention to improve adherence to Type 2 Diabetes mellitus subjects in rural teaching hospital

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### ABSTRACT

The study aim was to assess medication adherence and adherence to self care among type 2 diabetics in a tertiary care teaching hospital and to identify factors which were associated with medication adherence. A prospective observational study was conducted in RMMCH, in Annamalai Nagar. The study was approved by the Institutional Human Ethics Committee (M18/RMMC/2015), the information on the data collection form included name, age, sex, social history, laboratory reports, diagnosis and prescribed medication list. Initially 345 patients were enrolled and appointed for our study. After 15 days of appointment, pre intervention study was conducted to the patients and immediately patient education and counseling was provided. Follow-up studies were carried out at intervals of 30 days and 45 days since appointment. Among patient-related barriers, forgetfulness were reported by 36.52% of patients followed by low literacy (19.13%), Stopped medications on being well (6.95%), clinical waiting for longer periods (5.12%) and frequent travelling by 2.60% of patients. Among medical related barriers, financial burden was the major factor reported by 13.04% of patients followed by 'Dependant on others for purchasing drugs' (16.52%). In pre intervention 95.65% (95% CI- 0.975-0.027) of patient had low adherence and 4.34% (95% CI- 0.071-0.019) of patient had medium adherence. When comparing with pre intervention, post intervention has good improvement of adherence scale. Only 18.26% (95% CI- 0.227-0.039) of patient had low adherence, medium adherence 76.52% (95% CI- 0.80- 0.48) and high adherence 5.21% (95%CI- 0.081-0.021). Patient medication adherences have improved considerably in the post intervention as compared with pre intervention, due to effective patient education and counseling.

**Keywords:** Medication adherence, Barriers of medication, type 2 diabetes mellitus.

### INTRODUCTION

Diabetes mellitus includes a group of common metabolic disorder that share the phenotype of hyperglycemia. Type 2 DM is a heterogeneous group of disorder characterized by variable level of insulin secretion and expanded glucose production [1]. In 2000, India (31.7 million) topped the world with the most noteworthy number of individuals with diabetes mellitus took after by China (20.8 million) with the United States (17.7 million) in second and third place respectively. The prevalence of diabetes is anticipated to increase twofold all around from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is anticipated that by 2030 diabetes mellitus may afflict up to 79.4 million people in India, while China (42.3 million) and the United States (30.3 million) will also see a significant increase in those affected by the disease. [7,8] Right now India faces an indeterminate future in relation to the potential burden that diabetes may force upon the nation. Numerous impacts influence the pervasiveness of

diseases all through the nation, and distinguishing proof of those components is important to encourage change when confronting wellbeing difficulties. The risk of death from cardiovascular disease is around threefold in patients with type 2 diabetes and the risk of death from all cases is expanded by 75% compared with patients without diabetes [2].

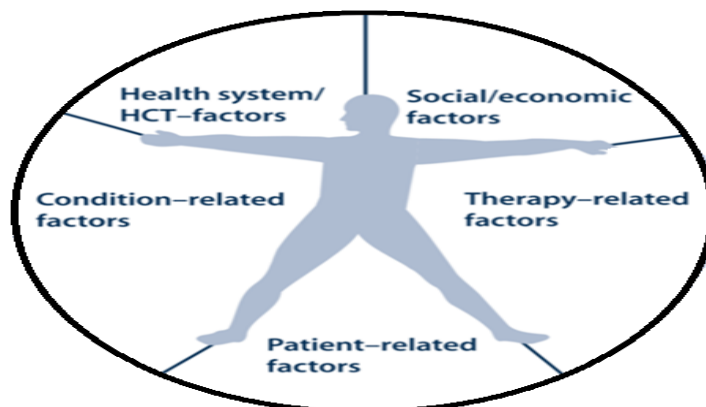
Adherence is the degree to which a patient conduct – taking medicine, following a diet, and/or executing life changes – relates with concurred suggestions from the health care provider [9]. On the other hand, medication non adherence is especially common among patients with type 2 diabetes [10] and insufficient adherence compromises safety and treatment effectiveness, leading to increased mortality and morbidity with considerable direct and indirect costs to the healthcare system.[11,12]

### **DIMENSIONS OF PATIENT ADHERENCE**

Patient adherence to a medication regimen is central to good patient outcomes. Central to adherence is the quality of the provider/patient relationship. Successful provider/patient communication is exactly connected to positive results of consideration, including understanding, fulfillment, health status, review of data, and adherence [13, 14]. Provider exchanges their knowledge with patients and provides assistance in understanding their disease and measure the risk and advantages of treatment.

Healthcare providers (as part of a healthcare team within the health system) are an essential part of the five connecting dimensions of medication adherence distinguished by the World Health Organization (WHO) (See Figure 1), which incorporate social/economic factors, medical condition-related variables, treatment related elements, and patient conducts. Recognizing techniques for enhancing medication adherence are the obligation of all involved, however the focus of this Time Tool is on the provider role in medication adherence.

**FIG: 1. DIMENSIONS OF PATIENT ADHERENCE**



### **MATERIALS AND METHODS**

**Study design:** A prospective observational study

**Study site:** The study was conducted at R.M.M.C.H, Annamalai University, Chidambaram, a 1250 bedded multi specialty tertiary care university teaching hospital located in rural India.

**Study period:** The duration of this study was 14 Months

**Study population and ethics:** Patients diagnosed with type 2 DM were recruited from the Rajah Muthiah Medical College & Hospital, Annamalai University, Chidambaram, India. The present study was approved by the Institutional Human Ethics Committee (M18/ RMMC/2015), Annamalai University, Annamalai Nagar, India.

**Data collection:**

The information on the data collection form included name, age, sex, social history, laboratory reports, diagnosis and prescribed medication list. The study enrolled 315 patients and informed verbal consent was received from each patient and they were further inquired for other Co morbidities

**Inclusion criteria:**

- All the inpatients as well as outpatients diagnosed with diabetes alone and also with Co morbidity diseases
- Patient with the age group above 18 and below 75
- Those who were exposed to any adverse drug reactions in hospital

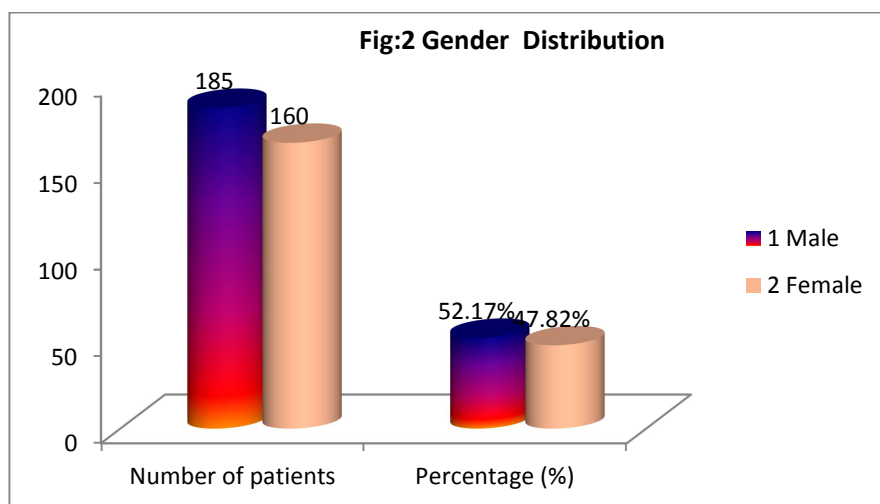
**Exclusion criteria:**

- The Patient is having BP 180/110 mm/Hg or higher
- Patients in the age group below 18 and above 75
- Patient intellectual or physical disability that preventing them from participating in this study.
- Patient with drug abuse
- The prescriptions containing incomplete information are excluded from this study.
- Patients who were discontinued and not willing to participate in the study were excluded from this study.

The main aim of this study was to assess medication adherence and adherence to self care among type 2 diabetics in a tertiary care teaching hospital and to identify factors which were associated with medication adherence. The data were analyzed using “SPSS Statics 20” software package. The 95% confidence interval (CI) for binomial proportions was used for the statistical analysis.

**RESULTS AND DISCUSSION**

A total of 345 consecutive patients were enrolled and filled questionnaires were documented. The patient’s medical record and prescription were reviewed for counseling and medication adherence was measured. Among the study population (n=345) male patients were more in number (185) when compared with female patients (160). In total, 52.17% of the patients were males and 47.82% of the patients are females.



Data related to the age of onset of diabetes or age of diagnosis of diabetes versus the number of patients was illustrated in Figure 3. The majority of patients (114 patients, 33.04%) diagnosed for diabetes belongs to the age group of 41- 50 years, followed by 108 patients (31.3%) in the age group of 51-60 years and 75 patients (21.73%) belongs to the age group of 61-70 years. Among the study population, we observed that 6.08% (21 patients) were living with diabetes until 80 years due to advances in the field of medicine. However, early diagnosis of diabetes (27 patients, 7.82%) in the age group of 30-40 years is an alarming factor. Early type-2DM may cause lots of health related complications and give rise to  $\beta$  cell resistant in the pancreas, which will lead to alteration in therapeutic management from oral hypoglycemic agents (OHA) to insulin which will be a great burden to the patient and healthcare sector.

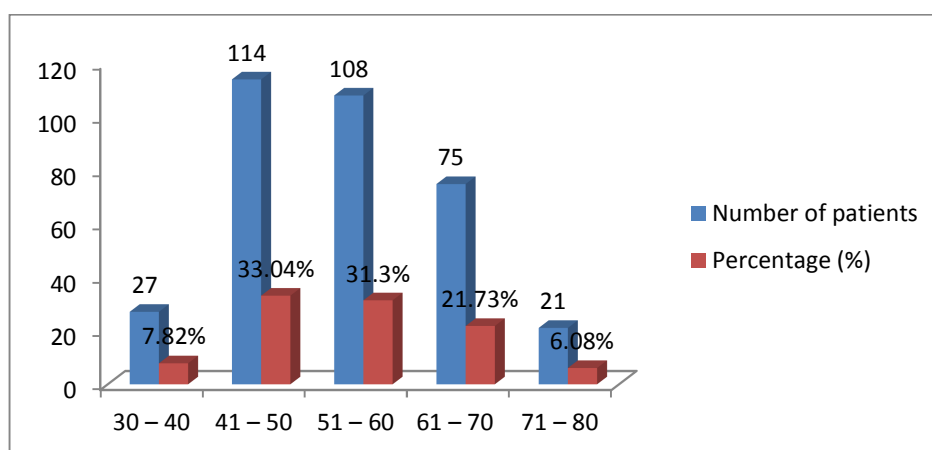


Fig 3: Age Distribution

Treatment of co-morbid diseases is really a challenge factor in therapeutic management of type-2DM diabetes among the population. The data for Co morbid disease characteristics are represented in **Table1**. Among the study population, 20.00 % of patients were having hypertension along with diabetes (DM+HTN) then followed by DM +HTN+ CAD (12.17 %).

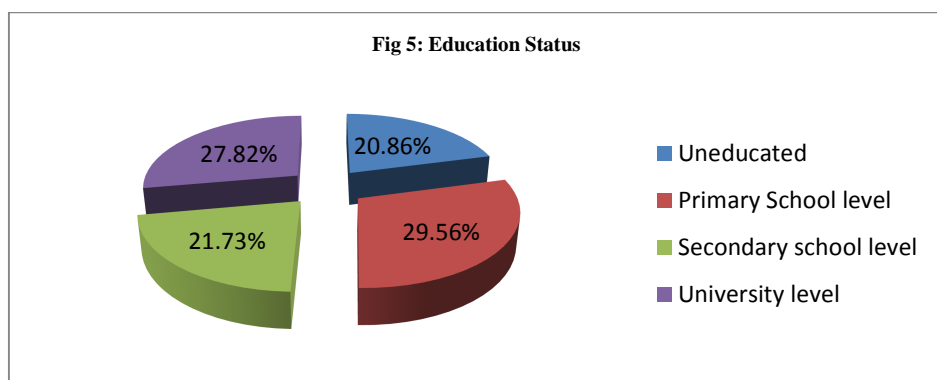
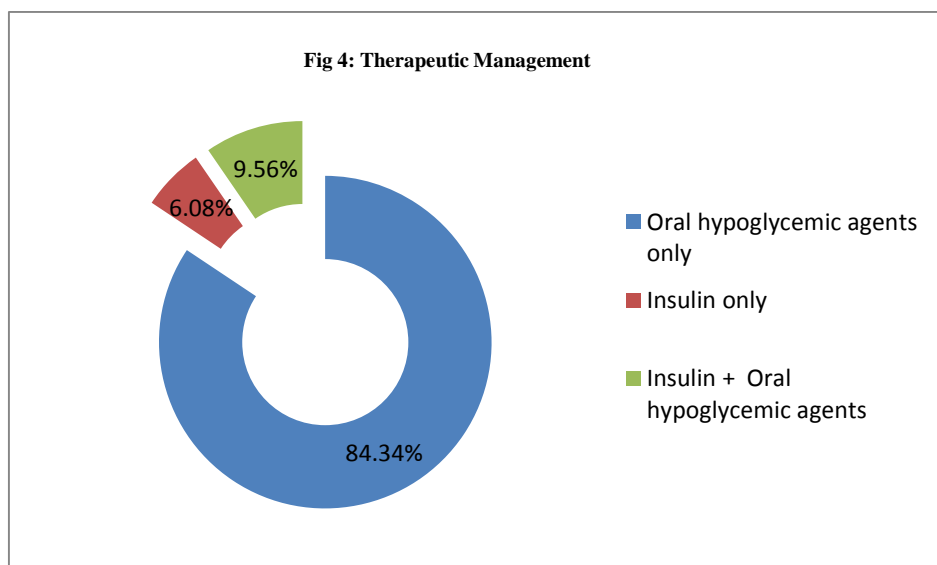
Table1: Co – Morbidities Diseases

S. No	Co – Morbidities	Number of patients	Percentage (%)
1	DM alone	78	22.60
2	DM +HTN	69	20.00
3	DM +HTN+ CAD	42	12.17
4	DM + Arthritis	24	06.95
5	DM + Gastritis	21	06.08
6	DM + CAD	18	05.21
7	DM + Foot Ulcer	15	04.34
8	DM + Gastritis + Obesity	09	02.60
9	DM + Ketoacidosis	09	02.60
10	DM + Fundus Gastritis	09	02.60
11	DM + Alcoholic Hepatitis	06	01.70
12	DM + UTI	06	01.70
13	DM + Anemia	06	01.70
14	DM + seizure	03	00.86
15	DM + MI	03	00.86
16	DM + Peripheral Neuropathy	03	00.86
17	DM + Unstable Angina	03	00.86
18	DM + HTN + Cardiovascular stroke	03	00.86
19	DM + Dermatitis	03	00.86
20	DM + Filariasis	03	00.86
21	DM + Hypothyroidism	03	00.86
22	DM + HTN + CKD	03	00.86
23	DM + HTN + Foot ulcer	03	00.86
24	DM + HTN + UTI	03	00.86

Therapeutic management or plan was carried out in the T2DM patients according to their FBS, RBS and PPS levels. The Proper selection of drugs and designing of treatment regimen or protocol was initiated after analyzing the FBS, RBS and PPS value in each individual patient. The treatment plan or protocol used in the study population is represented in the **Figure 4**. The majority of patients (291 patients; 84.34%) were prescribed with OHA alone followed by 33 patients (9.56%) with (insulin + OHA) and 21 patients (6.08%) were prescribed with only insulin. No patient was treated only with diet control.

Education level of patients diagnosed with diabetes mellitus was illustrated in (**Figure 5**). The Majority of the respondents (29%) has completed education at primary school level, followed by 28% of patients, have completed

education at university level. This research shows that the majority of the respondents has completed education at primary school level.



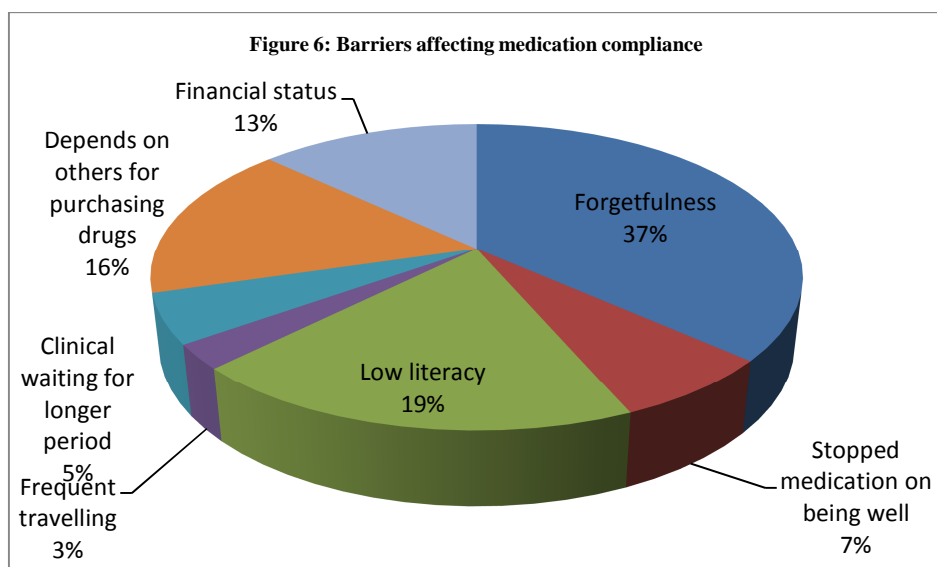
Initially 345 patients were enrolled and appointed for our study. After 15 days of appointment, pre intervention study was conducted to the patients and immediately patient education and counseling was provided. Follow-up studies were carried out at intervals of 30 days and 45 days since appointment. During second follow-up (i.e. At the 45<sup>th</sup> day of the appointment), the post intervention study was carried out in the same group of patients. The results of the study were furnished with table 2. Initially in pre-intervention study, we observed that 95.65% patients % (95% CI- 0.975-0.027) belongs to a low adherence group and 4.34% (95% CI- 0.071-0.019) of patients have exhibited medium adherence. Percentage of patients belonging to Low medication adherence have decreased significantly from 95.65% to 18.26% (95% CI 0.227 – 0.039) in the post intervention group. Similar percentages of patients belonging to medium adherence have increased significantly from 4.34% to 76.52% (95% CI 0.80 – 0.048) from pre-intervention to post intervention group. Moreover, in addition, 5.21% (95% CI 0.081 – 0.021) of patient have shown high adherence in the post intervention study. Hence, in total, Patient medication adherences have improved considerably in the post intervention as compared with pre intervention, due to effective patient education and counseling.

**Table No: 2. Distribution of scores in Modified Morisky Medication Adherence Scale**

	PRE INTERVENTION			POST INTERVENTION		
	Low adherence	Medium adherence	High adherence	Low adherence	Medium adherence	High adherence
<b>Number of patients</b>	330	15	00	63	264	18
<b>Percentage (%)</b>	95.65%	4.34%	00	18.26%	76.52%	5.21%
<b>95 % CI</b>	0.975 – 0.027	0.071 – 0.019	-	0.227 – 0.039	0.80 – 0.048	0.081 – 0.021

**Barriers affecting medication compliance (N=345)**

Among patient-related barriers, forgetfulness were reported by 36.52% of patients followed by low literacy (19.13%), Stopped medications on being well (6.95%), clinical waiting for longer periods (5.12%) and frequent travelling by 2.60% of patients. Among medical related barriers, financial burden was the major factor reported by 13.04% of patients followed by 'Dependant on others for purchasing drugs' (16.52%). The detailed information is depicted in **figure 6**.

**CONCLUSION**

Patient medication adherence is a major medical problem globally, leading to increase in mortality and morbidity with considerable direct and indirect costs to the healthcare system. Although there are several factors and barriers affecting medication adherence, patient education and counseling along with use of compliance aids, proper motivation and support play a significant role in improving patient compliance. The major barriers identified in our study like forgetfulness of medicine, low literacy, dependent on others for purchasing drugs, etc., can be overcome by continuous follow up and patient education by the pharmacist. Our study has demonstrated that medication adherence rate can be improved to a greater extent from pre-intervention to post-intervention through the contribution of pharmacists.

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