

“A Study of Medication Adherence among Type 2 Diabetes Mellitus Patients in Tertiary Care Teaching Hospital, Mandya, Karnataka (India)”

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Abstract

Original Research Article

Background: Diabetes mellitus (DM) is one among chronic disease requiring long term medication and its prevalence increasing globally. It is becoming a potential epidemic in India with more than 62 million diagnosed diabetics and an increase of nearly 2 million per year. Adherence to treatment is very important for good glycemic control. Poor adherence to medication regimens increases the probability of adverse outcomes in type 2 diabetes patients. Therefore, improving medication adherence is a growing priority to control this epidemic. Hence, this study was conducted to determine the level of adherence to medication in Type 2 diabetic patients and to study the various factors affecting adherence. **Methods:** A cross sectional study was conducted at medicine outpatient department (OPD) and general medical ward of a tertiary care teaching hospital, MIMS, Mandya, Karnataka, India. Among 200 type 2 diabetic patients for duration of 2 months using a predesigned and pretested semi-structured interview schedule and diabetes medication adherence was assessed by Morisky's medication adherence scale questionnaire. **Results:** Out of 200 participants, 15 (7.5%) were found to have high adherence while 67 (33.5%) had moderate and 118 (59%) had low adherence. Factors found to be associated with non-adherence were older age (>60years), females, low education status, unemployment, longer duration of disease, people from villages, diabetics without family support, poor socioeconomic status, cost, complexity of drug regimens, frequent dosing, long duration of treatment, lack of knowledge of disease and medications, non-availability of medications and absence of glucometer. 76.27% of the patients had poor plasma glucose control. **Conclusion:** There is a need to focus on improving adherence among type 2 diabetes patients and strengthening health care systems for regular supply of medicines and provide health education to the patients and their families emphasizing the need of adherence to medications.

Keywords: Diabetes mellitus, High adherence, Moderate adherence, Low adherence.

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INTRODUCTION

Diabetes mellitus is a major global public health problem. As World Health Organization (WHO) estimates that more than 422 million people worldwide have diabetes as of 2014[1]. According to world Health Organization there were around 31.7 millions individuals in India affected by diabetes during the year 2000, which is expected to rise to 79.4 millions by the year 2030 [2]. The country was also the largest contributor to regional mortality with 1,065,052 deaths caused due to diabetes 2013[3]. Diabetes Mellitus (DM) has emerged as a major health care problem in India [4]. Prevalence of diabetes mellitus in India varies from 5.6% in rural areas to 12.1% in major cities [5, 6]. Diabetes is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with

disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, action and or both. Most common form is type 2 diabetes.

Management of diabetes includes pharmacotherapy, dietary changes and life style modifications. Poor adherence to treatment of chronic diseases like diabetes is a worldwide problem of striking magnitude. Recently, WHO stated that only 50% of patients diagnosed with chronic illness like diabetes mellitus were fully compliant with their treatment regimen, in developing countries the rate being even lower[1]. Some Indian studies reveal very poor adherence to treatment regimens due to poor attitude towards the disease and poor health literacy among the general public [7, 8]. In developing countries

like India, limited resources, treatment costs, unequal distribution of health providers between urban and rural areas further hampers strict adherence to medications [9].

Type 2 diabetes is poorly controlled due to lack of adherence to treatment regimen. Prevalence of poor adherence ranges from 67% to 74% [9]. Number of studies have been published about non adherence to medication in type 2 diabetes mellitus however it is essential to evaluate adherence on a regular basis due to change in culture and life style. In addition, the introduction of new medicine in the market with their varied dosing schedule, efficacy and adverse drug profile may alter adherence. Poor adherence leads Poor glycemic control which has consistently shown to be associated with long term complications. Hence the present study aimed to determine the prevalence of non-adherence to medication and factors responsible for the same in type 2 diabetes mellitus patients.

METHODS

A hospital based cross-sectional study was conducted at the medicine outpatient department (OPD) and medical general ward of a tertiary care teaching hospital MIMS (Mandya institute of medical sciences) Mandya, Karnataka India for duration of 2 months. The study subjects were diagnosed Type 2 diabetic patients on medication for one or more than one year (oral hypoglycaemic drugs/insulin) aged 18 years and above. A convenience sample of 200 patients with confirmed diagnosis of Diabetes mellitus were selected for the

study. All those patients who did not give consent were excluded from the study. The patients attending Medicine outpatient department and medical general ward and fulfilling the inclusion criteria were enrolled consecutively. The study tools used were a predesigned and pretested semistructured interview questionnaire to study the level of adherence to medication and factors influencing it. Diabetes medication adherence was measured by Morisky's medication adherence scale (MMAS Questionnaire)[10]. It is a 8-item structural scale. The end score of the scale 8 indicates high adherence [6-8] medium adherence and less than 6 low adherences. Also, Plasma glucose levels of the adhered and non-adhered patients were compared to observe the severity of diabetes in both the groups and its effect on adherence to medication.

Ethical consideration and confidentiality

Ethical clearance for the study was obtained from Institutional Ethical Committee. Confidentiality of the participants was ensured and a written consent was obtained from the subjects after explaining the objectives of the study.

DATA ANALYSIS

Data analysis was done using SPSS version 16. All observations were in terms of percentage and proportions. Test of significance were applied for comparisons wherever required. P value less than 0.05 was considered to be statistically significant at 95% confidence level.

RESULTS

Table-1: Socio –demographic profile of the participants

Characteristics	number	Percentage
Age (years)		
18 -40	28	14
41-60	131	65.5
>60	41	20.5
Gender		
Male	108	54
Female	92	46
Place of residence		
City	39	19.5
Village	161	80.5
Education		
Illiterate	67	33.5
Primary schooling	49	24.5
Middle schooling	38	19
High schooling/PUC	29	14.5
Graduate / Post graduate	17	8.5
Occupation		
Unemployed	96	48
retired	18	9
disabled	8	4
Employed	78	39
Socio-economic status		
Upper	0	0
Upper middle	11	5.5
Middle	53	26.5
Upper lower	91	45.5
Lower	45	22.5

A total of 200 diabetes mellitus patients were enrolled in the study, out of which 92 (46%) were females and 108 (54%) were males. 131 (65.5%) participants belonging to 41 to 60 years age group followed by 41 (20.5%) belongs to above 60 years age group and 28 (14%) belongs to 18 to 40 years age group. Among the participants, 136 (68%) belong to lower socio-economic class and 64 (32%) belongs to middle class. One third of the participants, 67 (33.5%)

were illiterate and 17 (8.5%) patients were completed their graduation, 49 (24.5%) had Primary schooling, 38(19%) had Middle schooling, 29 (14.5%) completed their High schooling/PUC. Among 200 patients, 161 (80.5%) from village and 39 (19.5%) patients were from city. 96 (48%) patients were Unemployed, 18 (9%) were retired from job and Employed were 78 (39%) patients and 8(4%) were disabled. (Table 1)

Table-2: Clinical characteristics and adherence to medication among diabetic patients (N=200)

Disease related parameter	Total n (%)	High Adherence (n=15)	Medium Adherence (n=67)	Low Adherence (n=118)
Age (years)				
18-40	28 (14)	12(42.86)	10(37.71)	6(21.42)
40-60	131(65.5)	30(22.9)	48(36.64)	53(40.49)
>60	41 (2.5)	6(14.63)	10(24.39)	25(60.98)
Gender				
Male	108(54)	25(23.14)	43(39.81)	40(37.03)
Female	92(46)	21(22.82)	32(34.78)	39(42.39)
Education				
Illiterate	67(33.5)	10(14.92)	20(29.82)	37(55.22)
Primary schooling	49(24.5)	9(18.36)	18(36.72)	22(44.89)
Middle schooling	38(19)	10(26.31)	8(21.1)	20(52.63)
High schooling/PUC	29(14.5)	7(24.13)	9(31.03)	13(44.83)
Graduate / Post graduate	17(8.5)	6(35.29)	8(47.05)	3(17.64)
Employment				
Unemployed	96(48)	16(16.67)	35(36.46)	45(46.86)
retired	18(9)	6(33.33)	7(38.89)	5(27.78)
disabled	8(4)	2(25)	1(12.5)	5(62.5)
Employed	78(39)	25(32.05)	39(50)	14(17.95)
Socioeconomic status				
Upper	0	0	0	0
Upper middle	11 (5.5)	4 (36.36)	4(36.36)	3(27.27)
Middle	53 (26.5)	23(43.39)	17(32.07)	13(24.52)
Upper lower	91 (45.5)	21(23.07)	40(43.95)	30(32.97)
Lower	45 (22.5)	6(13.33)	14(31.11)	25(55.56)
Duration of disease since diagnosis (yrs)				
<5	105(52.5)	7(6.67)	41(39.05)	57(54.29)
5-10	61(30.5)	10(16.39)	24(39.34)	27(44.26)
>10	34(17)	3(8.82)	13(38.24)	21(61.76)
Treatment taken				
OHA	136(68)	25(18.38)	43(31.61)	68(50)
Insulin	41(20.5)	5(12.19)	17(41.46)	19(46.34)
OHA+ Insulin	23(11.5)	4(17.39)	8(34.78)	11(47.82)
Family support				
Present	45 (22.5)	22(48.89)	15(33.33)	8(17.78)
Absent	155 (77.5)	47(30.32)	58(37.42)	50(32.26)
Co morbidities				
Hypertension	82(41)	20(24.39)	24(29.27)	38(46.34)
IHD	34(17)	7(20.59)	11(32.35)	16(47.05)
Dyslipidimia	44(22)	12(27.27)	13(29.54)	19(43.18)
Obesity	26(13)	9(34.61)	7(26.92)	11(42.30)
Hypertension +IHD	27(13.5)	4(14.81)	6(22.2)	18(66.67)
Place of residence				
City	39(19.5)	17(43.59)	12(30.77)	10(25.64)
Village	161(80.5)	38(23.60)	41(25.46)	82(50.93)
Self-monitoring of blood glucose at home by glucometer				
Yes	18(9)	12(66.67)	4(22.22)	2(11.11)
No	182(91)	40(21.98)	42(23.07)	100(54.95)

A total of 200 diabetes mellitus patients were enrolled in the study, out of which 92 (46%) were females among which 22.82% had good adherence, 34.78% had moderate and 42.39% were poorly adherent to treatment regimens. 108 (54%) were males among which 23.14% had good, 34.78% were moderate and 42.39% had poor adherence. 28 (14%) participants belong to 18 to 40 years age group, out of which 42.86% had good, 37.71% were moderate and 21.42% had poor adherence followed by 41 (20.5%) belong to above 60 years age group, out of which 14.63% were good, 24.39% had moderate and 60.98% had poor adherence to treatment. 131 (65.5%) participants belong to 41 to 60 years age group, out of which 22.9% had good, 36.64% had moderate and 40.49% had poor adherence to treatment. Majority of the participants, 136 (68%) belong to lower socio-economic class, out of which 19.85%, 39.70%, 40.44% patients had good, moderate, poor adherence to treatment regimens respectively. 64 (32%) belong to middle class of which 42.19% had good, 32.81% moderate and 25% patients had poor medication adherence (Table 2).

One third of the participants, 67 (33.5%) were illiterate, out of which 14.92% patients were good, 29.82% had moderate and 55.22% of patients had poor adherence to treatment and 17 (8.5%) patients were completed their graduation, out of which 35.29% patients were good, 47.05% patients were moderate and 17.64% of patients had poor adherence to treatment regimens. Out of 200 patients in the study, 161 (80.5%) were from village, out of which 23.60% patients had good, 25.46% had moderate and 50.93% had poor adherence to treatment. 39 (19.5%) patients were from city, out of which 43.59% patients were good, 30.77% were moderate and 25.60% had poor adherence to treatment regimens. Among 200 study patients 96 (48%) patients were unemployed out of which 16.67% patients were good, 36.46% had moderate and 46.86% had poor adherence to treatment, 18 (9%) were retired from job. out of which 33.33% patients had good, 38.89% had moderate and 27.78% were poor adherence to treatment and Employed were 78 (39%) patients, out of which 32.05% had good, 50% had moderate and 17.95% had poor adherence to treatment and 8 (4%) were disabled, out of which 25% had good, 12.5% was moderately adherent and 62.5% had poor adherence to treatment (Table 2).

Out of 200 study subjects nearly half of the patients, 105 (52.5%) were diagnosed to be diabetic within last 5 years, out of which 6.67% patients were good, 39.05% had moderate and 54.29% had poor adherence to treatment while 61 (30.5%) patients had since 6 to 10 years, out of which 16.39% were good, 39.34% had moderate and 44.26% had poor adherence. 34 (17%) patients had diabetes for more than 10 years, out of which 8.8% patients had good, 38.24% patients were moderate and 61.76% had

poor adherence to treatment. Out of 200 study patients, 136 (68%) participants were taking oral hypoglycaemic agents (OHA), out of which 18.38% had good, 31.61% had moderate and 50% of patients had poor adherence to treatment, 41 (20.5%) patients were taking insulin therapy, out of which 12.19% had good, 41.46% had moderate and 46.34% had poor adherence. 23 (11.5%) were on both OHA +Insulin, out of which 17.39% patients were good, 34.78% had moderate and 47.82% had poor adherence. Regular self-monitoring of blood glucose at home by own glucometer seen among 18 (9%) patients, out of which 66.67% had good adherence, 22.22% had moderate and 11.11% had poor adherence to treatment and those who does not use glucometer were 182 (91%), out of which 21.98% had good, 23.07% had moderate and 54.95% had poor adherence to treatment regimens (Table 2).

Out of 200 study subjects, patients had one or more co-morbidities with hypertension being the most common co-morbidity in 82 (41%) patients, out of which 24.39% had good, 29.27% moderate and 46.34% had poor adherence followed by IHD (Ischemic heart disease) in 34 (17%) out of which 20.57% patients had good, 32.35% had moderate and 47.05% patients had poor adherence. Dyslipidemia in 44 (22%) out of which 27.27% had good, 29.54% had moderate and 43.18% were poor adherence, obesity in 26 (13%), out of which 34.61% had good, 26.92% had moderate and 42.30% patients had poor adherence and Hypertension +IHD in 27 (13.5%) patients, out of which 14.81% had good, 22.2% were moderate and 66.67% had poor adherence to treatment. Among study patients, 45 (22.5%) patients had Family support, out of which 48.89% patients had good adherence, 33.33% had moderate and 17.78% had poor adherence. 155 (77.5%) not had support from their family, out of which 30.32% had good adherence, 37.42% had moderate and 32.26% had poor adherence (Table 2).

Out of 200 study subjects, the most important reason preventing optimal adherence was financial constraint, among type 2 diabetes populations, the cost of Medication, finance constraints was found to be 36%, 62% respectively. Having their own glucometer at home for self-glucose monitoring seen in only 9% of the patients in our study. Other factor for non-adherence was complexity of dosage regimen, number of medications, frequency of dosing, side effects, duration of treatment was Found to be 17%, 27%, 24%, 6%, 66% respectively. Lack of knowledge about the disease seen in 38%. In present study, inadequate knowledge regarding therapy of 59.5%. The identified causes of non-adherence to taking anti-diabetic medications as prescribed were, decision to omit, nature of work /busy schedule of work, when felt worse, when felt better, and Forget fullness were found to be 20%, 12%, 29%, 35%, 17.5% in our study respectively. Doctor /system related factors like short consultation time, long waiting time, long travel time, lack of

privacy (overcrowding), poor response, unfriendly relation with health professional, not giving detailed knowledge about disease, complications, medications, methods of treatment, importance of adherence, follow

up visits, self-care, non-availability of medications regularly, non-availability of all type of medications seen in 27%,21%,12.5%,63%,20%,17.5%,20%,17.5% respectively in this study. (Table 3).

Table-3: Factors affecting rate of medication adherence in Type 2 diabetic patients

Causes	Number of patients (%)
Non adherence to taking anti-diabetic medications as prescribed	
Social and Economic	
a. Costs of medication too expensive	72 (36)
b. Financial constrains	124(62)
c. Regular self monitoring of glucose using glucometer at home	18 (9)
Therapy- related factors	
a. Complexity of medication regimen	34 (17)
b. Number of medications/Too much medications	54 (27)
c. Frequency of dosing / Increasing number of dosing times	48 (24)
d. Side effects.	12 (6)
e. Long duration of treatment period	132(66)
Patient-related factors	
a. Lack of knowledge about the disease	76 (38)
b. Inadequate knowledge regarding therapy	119(59.5)
c.Forgetfulness	35(17.5)
d.Decision to omit	40(20)
e.Being busy/ busy schedule of Work	24(12)
f.Forget fullness + Being busy	19(9.5)
g.When felt better	70(35)
h.When felt worse/bad	58(29)
i. Others (pain due to injection, Hypoglycemia etc.)	28(14)
Doctor /system related factors	
a.Short consultation time	54(27)
b.Long waiting time	70(35)
c.Long travel time	40(20)
d.Lack of privacy (over crowding)	42(21)
e.Poor response	44(22)
f.Unfriendly relation with health professional	23(12.5)
g.Not giving detailed knowledge about disease, complications ,medications, methods of treatment,importance of adherence, follow up visits, self care	126(63)
h.Non availability of medications regularly	40(20)
i.Non availability of all type of medications	35(17.5)

Table-4: Summary of patient's responses to the Morisky medication adherence predictor scale (n=200)

Question	Yes	No
Response (score coding)	Number (%)	Number (%)
1. Do you sometimes forget to take your Medicine(s)?	137 (68.5)	63 (31.5)
2. Thinking over the past 2 weeks, were there any days when you did not take your medicine?	46 (23)	154 (75)
3. Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?	67 (33.5)	133 (66.5)
4. When you travel or leave home, do you sometimes forget to bring along your medicine?	68 (34)	132 (66)
5. Did you take all your medicine yesterday?	188 (94)	12 (6)
6. When you feel like your symptoms are under control, do you sometimes stop taking your medicine(s)?	131(60.5)	69 (34.5)
7. Taking medicine every day is a real inconvenience for Some people; do you ever feel hassled about sticking to your treatment plan?	87 (43.5)	113 (56.5)
8. How often do you have difficulty remembering to take all your medicines?	78 (39)	122 (61)
Distribution of scores	Total (N=200)	(%)
0	5	2.5
1	13	6.5
2	17	8.5
3	21	10.5
4	30	15
5	34	17
6	29	14.5
7	38	19
8	15	7.5
<6 (low adherence)	118	59
6-8 (moderate adherence) >-8 (high adherence)	67	33.5
	15	7.5

The assessment of patients response to 8-item Morisky medication adherence scale showed that 15 (7.5%) patients were good adherence, 67(33.5) patients

were moderately adherent and 118 (59%) patients were poor adherence to treatment regimens (Table 4).

Table-5: Association between adherence to medication and plasma glucose control (N=200)

Adherence pattern	Number of patients (%)	Plasma glucose status controlled (%)	not controlled (%)
High/good	15 (7.5)	11(73.33)	4(26.67)
Medium	67 (33.5)	40 (59.70)	27(40.29)
Low	118 (59)	28(23.73)	90 (76.27)
Total	200	79 (39.5)	121(60.5)

Out of 200 participants, 79(39.5%) patients had good blood glucose control and 121 (60.5%) had poor blood glucose control. 15 (7.5%) patients were found to have high adherence, 67 (33.5%) patients had moderate and 118 (59%) patients had low adherence to diabetes medications where adherence was assessed using Morisky Medication Adherence Scale (MMAS)[10]. The association between adherence to medications and status of plasma glucose control was seen. Those patients having good adherence 15 (7.5%) and medium adherence 67 (33.5%) patients were found to have better plasma glucose control of 11 (73.33%)

and 40 (59.70%) respectively than low adherence 118 (59%) patients who had poor plasma glucose control of 90 (76.27%) (Table 5).

DISCUSSION

Adherence to prescribed medications is essential for metabolic control and reduce complications. The present study showed Out of 200 participants, 15(7.5%) patients were found to have high adherence, 67 (33.5%) patients had moderate adherence and 118 (59%) patients had low adherence to diabetes medications and which is nearly similar to study by

Divya S *et al.* in a tertiary hospital of South India in 2015 reported non-adherence in 82 (54.6%) and adherence 68(45.4%) patients [11] and study by Imran M *et al.* in a diabetic clinic in Bangalore reported a non-adherence rate of 122 (61%) while 42 (21%) were high adherent and 36(18%) were moderately adherent[12]. And rate differs in study by Sajith M *et al.* from a hospital in Pune where 43 (40.95%) patients had good adherence whereas 39 (37.14%) had medium adherence and 23 (21.90%) had low adherence and our study also showed that high adherence was associated with good plasma glucose control of 73.33% and low medication adherence showed poor plasma glucose control 76.27% which is similar to study by Sajith M *et al.* showed that high adherence was associated with plasma glucose control in 53.49% and low medication adherence showed poor plasma glucose control in 86.96% [10].

Our results have shown that therapeutic adherence was significantly affected by different patient factors like age, gender, family support, educational status, employment, place of residence and socioeconomic status and duration of disease, family support, and other medical comorbidities. The present study, showed a high rate of good adherence in male with 25 (23.14%) than females 21(22.82%) which is similar to Study by Sajith M *et al.* which showed good adherence in male with 26 (43.33%) than females 17 (37.78%)[10] may be this due to relatively more awareness and economic independency among males from developing country villages. Incontradiction, study by Mahamed I, *et al.* showed high rate of good adherence in females 30 (15%) than male with 12 (6%) [12].The present study, showed a high rate of good adherence in young people of less than 40 years, 12 (42.86%) than elderly which is same as study by Mohamed E E *et al.* with 51.8% and lesser adherence was found in Elderly and middle age group [13] May be this is because older people get tired of taking medications for and longer duration and with economic issues.

In present study, patients with higher education like graduates and post graduates showed 35.39% of higher compliance than illiterates of 14.92%. Which is similar to study of Martin L R *et al.* [19] which differs In Study by Sajith M *et al.* showed, illiterates had higher compliance of 47.62% compared to literates 30% [10] our study showed that employed patients had high medication adherence rate with 32.05% compared to unemployed patients 16.67%, which differs in Study by Sajith M *et al.* showed, high medication adherence rate with 41.46% compared to employed patients 30.00%[10] our study showed that diabetics who had Support by family members shown high medication adherence of 48.89% compared to non-supportive family in 30.32%. Is same in Study by Sajith M *et al.* 45.94% supportive and 35.29% among non-supporters [10]. Similar result with 47.7% was

found in study by Mohamed E E *et al.* [13], our study showed that diabetics coming from city had more good adherence of 43.59% compared to people from village 23.60% which is similar to study conducted in Egypt by Maria Kurowska *et al.* 41.9% In urban and 34.4% in rural adherence rate[14]. This is may be because of accessibility, awareness relatively more in urban people.

The duration of diabetes plays an important role in management of diabetes.52.5% had a diabetic history of 1-5 years which is similar to study by Sajith M *et al.* in 43.81% [10] and Upadhyay D K *et al.* 70.33% [17]. In our study, two third of diabetics 68% were taking OHAs and 20.5% of the people were on insulin therapy among which high adherence of 18.38% seen in OHA therapy people than 12.19% of insulin therapy patients which is similar to Study by Sajith M *et al.*[10] this is due to easy mode of administration, independently can be taken in longer course.The most important reason preventing optimal adherence was financial constraint among type 2 diabetes population, our study showed, the cost of Medication,finance constraints was found to be 36%, 62% respectively which is similar to Study by Sajith M *et al.* 34.29%, 66% [10].

Other factor for non-adherence was complexity of dosage regimen, number of medications, frequency of dosing, side effects, duration of treatment was Found to be 17%,27%,24%,6%,66% respectively which is similar to study by Sajith M *et al.*[19].05%,25.71%,18.10%,0.95%,58.10%, which is significantly lower than The study carried out in Ethiopia by Yusuff KB *et al.* [15]. Lack of knowledge about the disease seen in 38% which similar to study by Sajith M *et al.* in 31%. In present study, inadequate knowledge regarding therapy of 59.5% which is near to Study by Mahamed E E. *et al.* In Egypt where he found with 62.0% [13]. The identified causes of non-adherence to taking anti-diabetic medications as prescribed were, decision to omit, nature of work /busy schedule of work, when felt worse, when felt better, and Forget fullness were found to be 20%,12%,29%,35%,17.5% in our study which is similar study by Sajith Met. 19%, 11.42%, 33.33%, 33.33% and 16.19%, respectively [10], and which are lower than the study by Rolando N et.al from Nigeria [18].

The factors found to be associated with non-adherence were older age, females, low education status, unemployment, longer duration of disease, people resides in villages, diabetic without family support, poor socioeconomic status, cost, complexity of drug regimens, frequent dosing, long duration of treatment, lack of knowledge of disease and medications, side-effects, forgetfulness short consultation time, long waiting time, long travel time, lack of privacy (overcrowding), poor response,

unfriendly relation with health professional, not giving detailed knowledge about disease, complications, medications, methods of treatment, importance of adherence, follow up visits and self-care, non-availability of medications regularly, non-availability of all type of medications and absence of glucometer.

CONCLUSION

From this study, it is seen that adherence to medication was poor and as a result, plasma glucose control was poor in majority of patients. Hence, there is a need to focus on improving adherence among type 2 diabetes patients as it leads to better clinical outcomes and less complications in such patients. Various factors of medication non adherence were identified and evaluated. Therefore we recommend interventions that will address these factors of non-adherence in order to improve medication adherence. It was found that those patients who were dependent on government health care system for medications were less adherent to medications. Thus, there is a definite need to improve health care systems for regular supply of medicines and provide health education to the patients and their families emphasizing the need of adherence. The physicians Improving on the areas of patient education and medication counselling, communication, encouraging patients to monitor their blood glucose level regularly, simplifying drug regimen with decreasing the number of drug taken, medication selection bearing in mind cost and in tolerable side effects of the medications.

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