Medication Adherence using Medication Possession Ratio and Proportion of Days Covered among Elderly Diabetic Patients Visiting a Tertiary Care Hospital in Puducherry

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Patient adherence to treatment is crucial for successful therapy while treating chronic conditions like diabetes mellitus. Medication possession ratio (MPR) and proportion of Days Covered (PDC) are the most common measures of medication adherence using refill records. A prospective hospital-based longitudinal study was carried out among elderly patients, both males and females on oral hypoglycaemic medication from May-August 2019 in the Department of General Medicine in Puducherry. MPR was calculated as the sum of the days' supply for all fills of a given drug in a particular period divided by the number of days in the period while PDC was calculated as the number of days the drug supplied during the study period divided by the number of days in the study period. MPR and PDC ≥ 80% was considered as adherence to medication. In our study, 80% of elderly diabetic patients were adherent to medication according to medication possession ratio (MPR), while adherence according to the proportion of days covered was much lesser and was only 64.4%. We found a significant association between medication adherence in elderly diabetic patient's factors such as monthly family income, literacy, and presence of a caretaker while there was no association between medication adherence in elderly diabetic patients upon the age of the patient, number of drugs prescribed and monthly cost of the medicines. Medication adherence in elderly diabetic patients mainly depends on many factors such as monthly family income, literacy and presence of the caretaker and not depending upon the age of the patient, number of drugs prescribed and monthly cost of the medicines. Larger studies are necessary to realize the proper impact of nonadherence on this group of the population.

Keywords: Adherence; Elderly Diabetic; Literacy; Presence of caretaker; Proportion of days covered; Medication possession ratio; Monthly family income.

Diabetes Mellitus is a metabolic disorder characterized by hyperglycemia, glycosuria, and hyperlipidemia.[1] The prevalence of type 2 Diabetes Mellitus is increasing and has become one of the major public health problems worldwide. As per International Diabetes Federation (IDF), there will be around 642 million people with diabetes at the end of 2040.[2] Oral hypoglycemic medicines lower the blood glucose level and are used only in the treatment of type 2 diabetes.

Non-adherence to prescribed medicines is more common in patients with a chronic illnesses like diabetes, hypertension and hyperlipidemia. Patient adherence to treatment is crucial for successful therapy while treating these chronic conditions. In diabetes mellitus, poor medication adherence leads to poor glycemic control, causes severe health complications and increases medical costs.[3]

Despite general awareness, improving medication adherence to chronic diseases is historically challenging due to its complex and patient-specific nature. According to WHO, the average non-adherence rate is 50% among chronically ill patients.[4] Elderly patients have more illnesses, leading to the use of multiple drugs, a condition known as polypharmacy that can affect adherence.[5]

Adherence can be measured by interviews, surveys, pill counts and drug assays, but they have certain disadvantages like expensive accuracy, burdensome, reliability, skipping of questions, labor intensive and lack of personalization.

Medication possession ratio (MPR) and Proportion of days covered (PDC) are the most common measures of medication adherence using refill records. MPR is defined as the number of days medication is supplied within the refill interval divided by the number of days in the refill interval while PDC is defined as the number of days the medication is supplied during the study period divided by the number of days in the study period. They are objective and relatively simple to calculate compared with other methods.[6]

There are many studies on medication adherence using other methods but few are there on MPR and PDC in India. Hence, we planned this study to evaluate medication adherence using MPR and PDC among elderly diabetic patients attending medicine OPD of a tertiary care hospital in Puducherry.

METHODOLOGY

Study subjects

A prospective hospital-based longitudinal study was conducted in May-August 2019 (4 months) in the department of General Medicine of a tertiary care hospital in Puducherry. This study was carried out among elderly patients (age 60 years or above), both males and females on oral hypoglycaemic medication and willing to give informed written consent.

Inclusion Criteria
1. Elderly patients 60 years or above (either sex)
2. Visiting the Department of Medicine of the tertiary care hospital from May-August 2019
3. Patients diagnosed with type 2 diabetes mellitus and on oral hypoglycemic medication

Exclusion criteria
1. Emergency and intensive care unit patients.
2. Patients with serious illness, malignancy and other complications.
3. Death of patients during the study period

Sample Size

Given the study duration, 4 months (1-month recruitment then 3 months follow-up) and considering the previous year's data on the number of elderly patients attending the Department of Medicine with type 2 diabetes mellitus prescribed oral hypoglycemic drug; approximately 50 patients were included in the present study.

Data collection procedure

Information regarding MRD number, name, age, sex, monthly income of family, education and contact, number of elderly patients or caretakers, date, diagnosis, name, number of drugs prescribed and cost of medication at the time of hospital visit, etc. were collected. A total of 50 patients were recruited within one month. Out of these, 5 patients were excluded from the study as they were not responding after repeated attempts after the first refill. Thus, 45 patients were included in the final evaluation of the study. Each participating elderly patient's refill record of the oral hypoglycemic drug was recorded for a period of 3 months. The patient was contacted on mobile after 3 days from the next refill date to note the subsequent refills and if the medication was not refilled (purchased) then an alternate day phone call was made till the medication was refilled. At the end of the study period, the number of remaining drugs were counted. Using this information, the MPR and PDC were calculated.

Calculation of MPR: MPR was calculated by the supply of oral hypoglycemic drug during the observation period, divided by the number of days between the first and last dispensing; multiplied by 100 to obtain the percent.[6]

Calculation of PDC: PDC was calculated as the number of days the oral hypoglycemic drug supplied during the study period divided by the number of days in the study period; multiplied by 100 to obtain the percent.[6]

The MPR and PDC $\geq 80\%$ was considered as adherence to medication, $<80\%$ was considered as non-adherence.

Statistical analysis

Data entry was done in Microsoft_ Office_Excel 2010. Data were analyzed using the professional statistics package EPI_Info_7.0 version for windows. Descriptive data were represented as mean $\pm$ SD for numeric variables, percentages, and proportions for categorical variables. Chi-square and Fisher exact test were used for the association between categorical variables. p-value <0.05 was considered statistically significant.

Ethical Clearance

Ethical permission to conduct the hospital-based study was obtained from Institution Ethical Committee before conducting the actual study. Subject confidentiality was maintained during and after data collection. (IHEC/ICMR PROJECT/08/2019/20)

RESULTS

Elderly diabetic patients were classified into three age groups 60-70, 71-80, and ≥ 80 yrs.

Most commonly visited elderly diabetic patients were from the 60-70 yr age group (86.67%) followed by the 71-80 yr age group (8.89%) and the least were from the ≥ 80 yr age group (4.44%). Out of the 45 elderly diabetic patients who visited the hospital during the study period, 36 (80%) were males and 9 (20%) were females.

The educational level of the patients was classified into three categories, illiterate, up to secondary school (SSC) and higher secondary school (HSC), and higher degrees. The maximum number of elderly diabetic patients were educated up to secondary school (46.67%) followed by illiterate (28.89%) and then HSC and higher (24.44%).

The monthly family income of elderly diabetic patients has been divided into four income categories Rs. ≤ 10000, Rs. 10001-25000, Rs. 25001-50000, and Rs. ≥ 50000 based on data obtained from the patients. Monthly family income of elderly diabetic patients was between Rs 25001-50000 (35.56%) for a maximum number of patients followed by 10001-25000 (26.67%), Rs. ≤ 10000 (24.44%) and ≥ 50000 (13.33%) respectively. (Table 1)

The monthly cost of the medicines purchased by elderly diabetic patients has been divided into four categories Rs. ≤ 500, Rs. 501-1000, Rs. 1001-2000 and Rs. ≥ 2000 based on their total monthly cost of medicines.

Table 1. Demographic profile of elderly diabetic patients

Demographic Characteristics		Frequency	Percent
Age Group (Yr)	60-70	39	86.67%
	71-80	4	8.89%
	≥ 80	2	4.44%
	Minimum Age	60	
	Maximum Age	86	
	Mean Age	65.31 ± 6.32 yr	
Gender	Males	36	80%
	Females	9	20%
Educational Level	Illiterate	13	28.89%
	Up to SSC	21	46.67%
	HSC and Higher	11	24.44%
Monthly Family Income (Rs.)	≤ 10000	11	24.44%
	10001-25000	12	26.67%
	25001-50000	16	35.56%
	≥ 50000	6	13.33%

The maximum number of elderly diabetic patients (31.11%) spent ≤ Rs 500 for their medicines followed by Rs. 1001-2000, Rs 501-1000 and ≥ Rs 2000 monthly spent by 24.44%, 22.22% and 22.22% respectively. (Table 2)

The number of drugs prescribed to elderly diabetic patients was grouped into three categories 1-2 drugs, 3-4 drugs, and ≥ 5 drugs based on the drugs prescribed to them.

The maximum number of drugs prescribed were 1-2 and ≥ 5 both in 40% of patients and the least prescribed were 3-4 drugs in 20% of patients. (Table 3)

The refill frequency of medicines prescribed to elderly diabetic patients was also grouped into three categories 1-3 times, 4-6 times and ≥ 7 times based on their refill frequency.

Out of the 45 elderly diabetic patients, 30 (66.67%) patients refilled medicine for maximum times, i.e. 4-6 times followed by 14 (31.11%) patients who refilled medicines for ≥7 times while only 1 (2.22%) patient refilled medicine for ≤ 3 times. (Table 4)

Adherence to medication using MPR was in 36 (80%) while non-adherence using MPR was in 9 (20.00%) elderly diabetic patients. Adherence to medication using PDC was 29 (64.44%) while non-adherence using PDC was 16 (35.56%) in elderly diabetic patients. (Table 5)

Table 2. Monthly Cost of Medicine of the elderly diabetic patients

Monthly Cost of Medicines (Rs)	Frequency	Percentage
≤500	14	31.11%
501-1000	10	22.22%
1001-2000	11	24.44%
≥2000	10	22.22%

Table 3. Number of drugs prescribed to diabetic elderly patients

Drugs	Frequency	Percentage
1-2	18	40.00%
3-4	9	20.00%
≥ 5	18	40.00%

Table 4. Frequency of drugs refilled by diabetic elderly patients

Frequency of Refill	Frequency	Percentage
1-3	1	2.22%
4-6	30	66.67%
≥7	14	31.11%

Table 5. Adherence in an elderly diabetic patient using MPR and PDC

	MPR		PDC	
	Number	Percentage	Number	Percentage
Adherent (≥ 80)	36	80.00%	29	64.44%
Non-Adherent (< 80)	9	20.00%	16	35.56%

Table 6. Association between age and adherence using MPR and PDC in elderly diabetic patients

Age group (Yr)	MPR		PDC	
	Adherent (>=80)	Non Adherent (<80)	Adherent (>=80)	Non Adherent (<80)
60-70	31 (79.49%)	8 (20.51%)	25 (64.10%)	14 (35.90%)
71-80	4 (100.00%)	0 (0.00%)	3 (75.00%)	1 (25.00%)
≥ 80	1 (50.00%)	1 (50.00%)	1 (50.00%)	1 (50.00%)
Pearson Chi-Square	2.13		0.38	
Probability	0.34		0.83	

p value <0.05 value statistically significant

Table 7. Association between sex and adherence using MPR and PDC in elderly diabetic patients

Sex	MPR		PDC	
	Adherent (>=80)	Non Adherent (<80)	Adherent (>=80)	Non Adherent (<80)
Males	31 (86.1%)	5 (13.9%)	25 (69.4%)	11 (30.6%)
Females	5 (55.6%)	4 (44.4%)	4 (44.4%)	5 (55.6%)
Pearson Chi-Square	4.20		1.96	
Probability	0.04*		0.16	

p value <0.05 value statistically significant

Table 8. Association between education and adherence using MPR and PDC in elderly diabetic patients

Education	MPR		PDC	
	Adherent (≥ 80)	Non-Adherent (<80)	Adherent (≥ 80)	Non-Adherent (<80)
Illiterate	9 (76.92)	4 (23.08%)	7 (53.84%)	6 (46.15%)
Up to SSC	16 (76.19%)	5 (23.81%)	14 (66.66%)	7 (33.33%)
$\geq$ HSC	10 (90.91%)	1 (9.09%)	10 (90.91%)	1 (9.09%)
Pearson Chi-Square Value	1.086		3.91	
p-Value	0.581		0.142	

p value <0.05 value statistically significant

Table 9. Association between elderly diabetic patients having caretaker and adherence using MPR and PDC in elderly diabetic patients

Caretaker	MPR		PDC	
	Adherent (≥ 80)	Non Adherent (<80)	Adherent (≥ 80)	Non Adherent (<80)
Yes	30 (93.75%)	2 (6.25%)	25 (78.13%)	7 (21.88%)
No	6 (46.15%)	7 (53.85%)	4 (30.77%)	9 (69.23%)
Pearson Chi-Square	13.089		9.048	
Probability	0.001*		0.003*	

p value <0.05 value statistically significant

Table 10. Association between the number of prescribed medicines and adherence using MPR and PDC in elderly diabetic patients

Number of Drugs	MPR		PDC	
	Adherent (≥ 80)	Non Adherent (<80)	Adherent (≥ 80)	Non Adherent (<80)
1-2	15 (83.33%)	3 (16.67%)	12 (66.67%)	6 (33.33%)
3-4	6 (66.67%)	3 (33.33%)	4 (44.44%)	5 (55.56%)
$\geq$ 5	15 (83.33%)	3 (16.67%)	13 (72.22%)	5 (27.78%)
Pearson Chi-Square	1.25		2.08	
Probability	0.53		0.35	

p value <0.05 value statistically significant

We observed a statistically nonsignificant association between the age of elderly diabetic patients and adherence using MPR and PDC. Elderly patients of the age group 71-80 yr showed maximum adherence i.e 100% and 75% using MPR and PDC respectively followed by patients in the age group 60-70 yr showed adherence of 79.5% and 64.10% using MPR and PDC respectively. The least adherence i.e., 50% using both MPR and PDC was in elderly patients of group ≥ 80 yr. (Table 6)

We observed a statistically positive association between the sex of elderly diabetic patients and MPR while a statistically nonsignificant association between the sex of elderly diabetic

Table 11. Association between refill frequency of medicine and adherence using MPR and PDC in elderly diabetic patients

Refill Frequency	MPR		PDC	
	Adherent (≥80)	Non Adherent (<80)	Adherent (≥ 80)	Non Adherent (<80)
1-3	1 (100.00%)	0 (0.00%)	0 (0.00%)	1 (100.00%)
4-6	24 (80.00%)	6 (20.00%)	19 (63.33%)	11 (36.67%)
e"7	11 (78.57%)	3 (21.43%)	10 (71.43%)	4 (28.57%)
Pearson Chi-Square	0.27		2.13	
Probability	0.87		0.34	

p value <0.05 value statistically significant

Table 12. Showing an association between monthly family income and adherence using MPR and PDC in elderly diabetic patients

Monthly Family Income (Rs)	MPR		PDC	
	Adherent (≥80)	Non Adherent (<80)	Adherent (≥ 80)	Non Adherent (<80)
≤10000	7 (63.64%)	4 (36.36%)	4 (36.36%)	7 (63.64%)
10001-25000	10 (83.33%)	2 (16.67%)	6 (50.00%)	6 (50.00%)
25001-50000	13 (81.25%)	3 (18.75%)	13 (81.25%)	3 (18.75%)
≥50000	6 (100.00%)	0 (0.00%)	6 (100.00%)	0 (0.00%)
Pearson Chi-Square	3.44		10.16	
Probability	0.33		0.017*	

p value <0.05 value statistically significant

Table 13. Showing an association between the Monthly Cost of Medicines and adherence using MPR and PDC in elderly diabetic patients

Monthly Cost of Medicines (Rs)	MPR		PDC	
	Adherent (≥80)	Non Adherent (<80)	Adherent (≥80)	Non Adherent (<80)
≤500	11 (78.57%)	3 (21.43%)	8 (57.14%)	6 (42.86%)
501-1000	7 (70.00%)	3 (30.00%)	7 (70.00%)	3 (30.00%)
1001-2000	9 (81.82%)	2 (18.18%)	7 (63.64%)	4 (36.36%)
≥2000	9 (90.00%)	1 (10.00%)	7 (70.00%)	3 (30.00%)
Pearson Chi-Square	1.2906		0.5983	
Probability	0.7314		0.8968	

p value <0.05 value statistically significant

patients and PDC. Adherence to medication using MPR was significantly higher in elderly male patients (86.1%) than in female (55.6%) patients. Adherence to medication using PDC was higher in elderly male patients (69.4%) than in female (44.4%) patients but was statistically nonsignificant. (Table 7)

Although there was no significant association between the education of elderly diabetic patients and adherence using the MPR and PDC, adherence using both MPR and PDC was more in elderly diabetic patients who were educated up to HSC and more (90.91%) than in other groups. (Table 8)

We observed a statistically significant positive association between caretakers of elderly diabetic patients and adherence using both MPR and PDC. Adherence to medication using MPR was significantly higher in elderly male patients (93.75%) having caretakers than the patients who didn't have caretakers (46.15%) while adherence to medication using PDC was also significantly higher in elderly male patients (78.13%) having caretakers than the patients didn't have caretakers (30.77%). (Table 9)

We observed a statistically non-significant association between the number of prescribed medicines to elderly diabetic patients and adherence using MPR and PDC. Maximum adherence was found in elderly diabetic patients prescribed with 1-2 medicines and more than 5 medicines, while those prescribed 3-4 medicines showed less adherence using both MPR and PDC but was not statistically significant. (Table 10)

There was no statistically significant association between the frequency of refill of medicines by elderly diabetic patients to adherence using MPR and PDC. Adherence using MPR was found more in elderly diabetic patients who refilled their medicine 1-3 times (100.00%), followed by 4-6 times (80.00%) and $\geq$ 7 times (78.57%) respectively, while adherence using PDC was found more in elderly diabetic patients who refilled their medicine for 4-6 times (63.33%) followed by $\geq$ 7 times (71.43%) in elderly diabetic patients. (Table 11)

We observed a statistically significant association between the monthly family income of elderly diabetic patients and adherence using PDC while no significant association using MPR.

Adherence using MPR was higher in elderly patients whose family income falls under the category of Rs $\geq$50000 (100.00%) followed by falls under the category of Rs 10001-25000 (83.33%) and Rs. 25000-50000 (81.25%) income group respectively. Adherence using MPR was lowest in elderly diabetic patients falling under Rs $\leq$ 10000 income group (63.64%).

Adherence using PDC was also higher in elderly patients whose family income falls under Rs $\geq$ 50001 (100.00%) followed by Rs. 25000-50000 (81.25%) and Rs. 10000-25000 (50.00%) groups respectively. Adherence using PDC was lowest in elderly diabetic patients falling under Rs $\leq$10000 income group 4 (36.36%). (Table 12)

We observed statistically no association between the monthly cost of medicines of elderly diabetic patients to adherence using MPR and PDC. Adherence using MPR was higher in patients whose monthly cost of medicines was Rs $\geq$2000 (90.00%) followed by Rs. 1001-2000 (81.82%) and Rs. $\leq$ 500 (78.57%) groups respectively. Adherence using MPR was lowest in patients whose monthly cost of medicines was Rs. 501-1000 (70.00%). Adherence using PDC was higher in elderly patients whose monthly cost of medicines was Rs. $\geq$2000 (70.00%) and Rs 501-1000 (70.00%) followed by Rs. 1001-2000 (63.64%) group. Adherence using PDC was lowest in patients whose monthly cost of medicines was Rs. $\leq$ 500 (57.14%). (Table 16)

DISCUSSION

This study was carried out in elderly patients above 60 years with type 2 Diabetes Mellitus in a tertiary care teaching hospital, in Puducherry. The main aim of this study was to determine adherence among elderly patients with type 2 diabetes mellitus. Non-adherence to prescribed medicines has been a common issue with this condition and adherence is the key factor to improving the health care of the population.[7,8] Many studies pointed out that there is increased morbidity, mortality and cost of healthcare due to a lack of adherence to medications for chronic conditions.[9]

We calculated the adherence to antidiabetic medications using the medication possession ratio and proportion of days covered. MPR and PDC

are the most common measures of medication adherence using refill records. MPR may be more than a hundred percent as it is calculated based on the number of medicines patients have in their hand during the study period while PDC excludes the extra medicines they have after completion of the study period then the ratio is calculated. Most of the time, MPR is higher than PDC. Although MPR is more commonly used, PDC is becoming the preferred adherence measurement as it won't inflate medication adherence among patients. In our study, we found that 80% of elderly diabetic patients were found adherent to medication according to MPR, while adherence according to the PDC was much lower and was only 64.4%. Previous studies reported that the adherence to oral hypoglycemic agents was nearly 50-80%. Our study results go by the study done by Fedrick F. *et. al.,* in Mwanza city and Hana T. A. Majed *et. al.,* in which they showed that nonadherence to antidiabetic medication was 26.1% and 28.3%, respectively, but there also few studies showing that the percentage of nonadherence to the medications was less.[10,11] Study done by Lin LK *et, al.,* the nonadherence using MPR was around 35%, which was comparatively more than the present study.[3] The study done by Parada *et. al.* showed that the percentage of non-adherents was only 9.9% which was too less when compared to the present study.[12] Thus, medication adherence varies from study to study may be due to the different areas and different ages of the population covered in the studies and also due to some health education that may be given to improve adherence among the patients.

The present study shows that the age of elderly diabetic patients does not show any effect on medication adherence. We observed a statistically nonsignificant correlation between the age of the elderly diabetic patients and adherence using MPR and PDC. More adherence was seen for both MPR and PDC in elderly patients with age less than 80 years, while adherence was decreased with age. The study done by Oung AB *et. al.* also concluded that the patients in the age group 70-79 years were more adherent.[13] The reason for more nonadherence in the age group more than 80 years may be due to a smaller number of patients in this group hence unable to distinguish adherence and nonadherence, also, they may be thinking the benefit from the treatment is less, the medicine

reduces the quality of life and adverse effects of the drugs.

This study also focused on associating medication adherence with gender. We observed a statistically significant correlation between the sex of elderly diabetic patients and MPR. Adherence using MPR was significantly higher in elderly male patients than in female patients. Several studies have found that women are more non-adherent than men, while some studies found no relationship between gender and adherence.[14] The reason for the lower adherence to medication according to MPR maybe they are dependent on purchasing medication from their counterparts, have less social support than men, or may stop taking the drug once they are recovered.[15,16,17]

The present study also reveals the association between the literacy of patients on medication adherence although it is not statistically significant. Adherence using MPR and PDC was higher in elderly patients who are educated, HSC and more than in other groups. Our study failed to show statistical significance because of the small sample size. Our study results resemble the study done by Parada *et. al*. who showed higher adherence in higher-educated patients and by Khan *et. al.,* who proved that patients with a low level of education are prone to non-adherence.[12,18] This may be because higher literacy patients could be able to understand the disease or its complications that occur due to the improper intake of medicines.

The present study also reveals the association between caretakers on medication adherence. We observed a statistically significant correlation between elderly diabetic patients having caretakers and adherence using MPR and PDC. Adherence using MPR and PDC was significantly higher in elderly diabetic male patients having caretakers than those without caretakers. Here, caretaker means paid persons or patient relatives. This may be because elderly patients may need some assistance to purchase tablets, and also, they are providing better use of medicines. Caretakers increase compliance with medical treatment, might reduce the risk of complications and will prevent unnecessary hospital admissions while saving costs.[19]

In the present study, there was no correlation between the number of prescribed medicines and refill frequency and adherence

using both MPR and PDC means patients reported medication adherence rates regardless of the number of medicines prescribed and frequency of refills. Our study results were similar to the study done by Grant *et. al.* but different from the study done by Perez *et. al.,* in which he explained that the complexity of medications also affects the percentage of adherence.[20] There is less literature available in the relation to polypharmacy and drug adherence.[21,22]

Financial background or socio-economic status also plays an important role in adherence to medications. The adherence level of the patients with high socioeconomic status was comparatively better when compared to the patients with low economic status, which was in accordance with the study done by Sevilla *et. al.,* in which he explained that those with high socioeconomic status had a high score for adherence to the medications. The monthly cost of medicine does not affect adherence to medications.[14] When patients are taking a greater number of medications, the cost of those medicines also increases, but it won't affect medication adherence. This is also proved when we found no association between the number of prescribed medicines and adherence.

Thus, medication adherence in elderly diabetic patients mainly depends on factors such as monthly family income, literacy, and presence of a caretaker and it does not depend upon the age of the patient, number of drugs prescribed and monthly cost of the medicines. Patients who were non-adherent to medication were given health education in the form of informational brochures that covers the advantages and disadvantages of adherence in their local language. In addition, non-compliant elderly patients and their relatives were sensitized to the advantages of medication adherence through a senior physician.

CONCLUSION

This study provided data to assess medication adherence using MPR and PDC, also, it assesses the causes for non-adherence to oral antidiabetic medication among elderly diabetic patients visiting a tertiary care hospital in Puducherry. From the present study, we can conclude that medication adherence in elderly diabetic patients mainly depends on many factors

such as monthly family income, literacy and presence of a caretaker and it does not depend upon the age of the patient, number of drugs prescribed and monthly cost of the medicines. The use of medicines for disease conditions is necessary, but an unnecessary load of drugs on the patient will increase safety problems. Patients who are non-adherent to medication have to be given health education to improve their adherence. Limitations of the study are that it has a small sample size, short duration of study and restriction to one disease. Larger studies involving larger sample sizes and longer duration are necessary to realize the proper impact of nonadherence on this group of population.

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