

Original research article

**Assessment of conditions impacting diabetes mellitus patients'
medication adherence: A prospective Study**

Dr.Ajnish Kumar¹, Dr.Subhargha Kumar^{2*}

¹Assistant Professor, Department of General Medicine, Lord Buddha Koshi Medical College and Hospital, Saharsa, Bihar, India

²Assistant Professor, Department of General Medicine, Lord Buddha Koshi Medical College and Hospital, Saharsa, Bihar, India

Corresponding Author: Dr.Subhargha Kumar

Received: 10-08-2023. Revised:27-09-2023. Accepted:15-10-2023.

Abstract

Aim: to determine the factors affecting medication adherence in diabetes mellitus patients.

Methods: A prospective cross-sectional study was conducted in the Department of General Medicine for one year . All diabetes patients (both Type 1 and type 2) having age more than 18 years and who were on diabetes medication were included. Total 200 patients were included in this study. A detailed questionnaire consisting of 25 questions which included demographic details and the questions on the reasons for the treatment interruption were given to all the patients visiting to study center.

Results: Mean age, weight, height and BMI of study cohort was 48.55±11.12 years, 66.87±12.28kgs, 163.69±9.11cm and 26.15±4.12kg/m² respectively. Majority of the patients were males 136 (68%). Of the 200 patients, majority were T2DM patients 196 (98%) followed by T1DM 4 (2%). Only 30 (15%) patients had family history of diabetes. Majority of the patients were illiterate 50 (25%) followed by 40 (20%) patients who were graduate. Majority of the patients were married 194 (97%), were businessman 50 (25%) and had monthly income between 5001 to 15000 rupees 40(20%). Majority of the patients were on oral antidiabetic medications 150 (75%) followed by Ayurvedic plus Oral Antidiabetic medication 40 (20%). Only, 10(5%) patients were on insulins. In present study majority of the patients were off the treatment since 1-5 months 160(80%) followed by 20(10%) patients who were off the treatment since 6-10 months. Most common response for the treatment interruption was long life medication period (73%) followed by the fact that majority were

not aware of the consequences of missing the doses (70%), 66% due to the side effect of the medication and 60% had financial problem.

Conclusions: Large number of diabetes patients had poor adherence. There are many modifiable factors which can be improved on individual basis to improve the glycemic outcomes.

Keywords: Diabetes complications, Diabetes mellitus, Modifiable risk factors, Side effects

Introduction

Diabetes mellitus consists of an array of dysfunctions characterized by hyperglycemia and resulting from the combination of resistance to insulin action, inadequate insulin secretion, and excessive or inappropriate glucose secretion.¹ The resulting hyperglycemia may lead to acute metabolic complications including ketoacidosis and in the long term contribute to chronic micro-vascular complications.² India has the largest population of diabetes patients when compared to any other country, diabetes deaths accounts for 9.7%.³ The management of Type 1 and Type 2 diabetes mellitus has improved because of remarkable advancement in insulin types over the years.⁴ Insulin is the most effective glucoselowering agent and is a key component of effective diabetes management over the course of diabetes.⁴ However, as injectable insulin therapy is associated with negative perceptions for patients, and they usually cannot feel consequences of skipping doses immediately, adherence/ persistence to insulin therapy among diabetic patients can be a particularly challenging issue.⁵ Adherence is defined as the extent to which a person's behavior taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider. Adherence to medication treatment is essential in order to obtain the full therapeutic benefit of diabetes management.⁶ Diabetes is a chronic condition in which evidence clearly links improved metabolic control via drug therapy to better outcomes. Because of this linkage, one might expect that greater adherence to medical regimens would be associated with better metabolic control, both due to a direct effect and possibly as a marker of adherence to other diabetes self-management behaviors.⁷ Adherence to medication is influenced by several factors such as lack of information, complexity of regimen, concomitant disease, perceptions of benefit, side effects, medication cost, and emotional well being.⁸

Materials and methods

A prospective cross-sectional study was conducted in the Department of General Medicine, Lord Buddha Koshi Medical College And Hospital, Saharsa, Bihar, India for one year. After

taking informed consent detailed history was taken from the patient or the relatives. The technique, risks, benefits, results and associated complications of the procedure were discussed with all patients

Inclusion criteria

All diabetes patients (both Type 1 and type 2) having age more than 18 years and who were on diabetes medication were included.

Exclusion criteria

Diabetes patients having age <18 years and suffering from serious complication and require hospitalization were excluded from the present study.

Methodology

Total 200 patients were included in this study. A detailed questionnaire consisting of 25 questions which included demographic details and the questions on the reasons for the treatment interruption were given to all the patients visiting to study center. Patients responded yes or no to each of the following questions: do you have financial problem, do you have no one to accompany you for visit, is diabetes medicine available in your area, do you find sufficient time to come for visit, are you busy in family obligation, is your medication lead to side effects, are you aware about the consequences of missing the doses, do you find it good to take long life medications.

All the data analysis was performed using IBM SPSS ver. 21 software. Frequency distribution was used for preparing tables. Quantitative data was expressed as mean±standard deviation whereas categorical data is expressed as percentage.

Results

Mean age, weight, height and BMI of study cohort was 48.55±11.12 years, 66.87±12.28kgs, 163.69±9.11cm and 26.15±4.12kg/m² respectively. Majority of the patients were males 136 (68%).

Table 1 Demographic profile of the patients

| Parameter | Mean |
|------------------|-----------------------------|
| Age | 48.55±11.12 years |
| Weight | 66.87±12.28kgs |
| Height | 163.69±9.11cm |
| BMI | 26.15±4.12kg/m ² |

Table 2 Gender distribution

| Gender | Number | Percentage |
|--------|--------|------------|
| Male | 136 | 68 |
| Female | 64 | 32 |

Table 3. Type of diabetes

| Type of diabetes | Number of patients | Percentage |
|------------------|--------------------|------------|
| T2DM | 196 | 98 |
| T1DM | 4 | 2 |

Of the 200 patients, majority were T2DM patients 196 (98%) followed by T1DM 4 (2%). Only 30 (15%) patients had family history of diabetes. Majority of the patients were illiterate 50 (25%) followed by 40 (20%) patients who were graduate. Majority of the patients were married 194 (97%), were businessman 50 (25%) and had monthly income between 5001 to 15000 rupees 40(20%).

Majority of the patients were on oral antidiabetic medications 150 (75%) followed by Ayurvedic plus Oral Antidiabetic medication 40 (20%). Only, 10(5%) patients were on insulins.

In present study majority of the patients were off the treatment since 1-5 months 160(80%) followed by 20(10%) patients who were off the treatment since 6-10 months

Table 4: Factors responsible for the treatment interruptions among diabetes patients

| Response (patients who had "Yes") | Number of patients | Percentage |
|--|--------------------|------------|
| Financial problem | 120 | 60 |
| No one to accompany for visit | 54 | 27 |
| Non availability of medicines in his area | 38 | 19 |
| Lack of time to come for visit | 84 | 42 |
| Busy in family obligation | 42 | 21 |
| Shifted to alternative treatment | 70 | 35 |
| Side effects of medication | 132 | 66 |
| Not aware of the consequences of missing the doses | 140 | 70 |
| Long life medication period | 146 | 73 |

| | | |
|--------------------------------------|-----|----|
| Lack of awareness to take medication | 128 | 64 |
|--------------------------------------|-----|----|

Most common response for the treatment interruption was long life medication period (73%) followed by the fact that majority were not aware of the consequences of missing the doses (70%), 66% due to the side effect of the medication and 60% had financial problem.

Discussion

Medication adherence is the important element of self- management for patients with diabetes mellitus.⁹ Uncontrolled hyperglycemia can result in micro- and macrovascular complications such as retinopathy, nephropathy, neuropathy and associated cardiovascular diseases. For achieving a good glycemic control in diabetes patients, a right treatment and its strict adherence is very important.¹⁰

Present study has shown that mean age of study cohort was 48.55 ± 11.12 years which is in agreement to Ascher- Svanum et al, which included 74,399 individuals where mean age of patient was 51.0 years (SD 9.0) years.¹¹

In present study authors observed male preponderance (68%) among diabetes patients which is hand in hand with the study done by Ascher-Svanum et al, where more than half of the enrolled diabetes patients were males (54%). Contrary to present study Awodele et al, reported female preponderance.^{11,12}

Previous studies have highlighted the cost of medication as the main influencing factor for the non- adherence to their medication (Table 4). Mojtabai et al, also reported that 7% of the patients were finding difficulties in purchasing medication due to the cost.¹³ Awodele et al, also reported that more than half of the patients found their medication unaffordable.¹² These findings are in agreement to the present study findings were more than half 60% of the patients responded to have financial problem because of that they were finding difficulty in purchasing diabetic medication. In entered study, financial difficulties were one of the key factor influencing the non-adherence among diabetes patients.¹⁴

It is also evident from the present study majority of the patients had monthly income between 5001 to 15000 rupees 40(20%). Therefore the possibility of treatment interruption is high due to the cost of medication because of financial problem. In present study Majority of the patients were illiterate 50 (25%) followed by 40 (20%) patients who were graduate. This shows a low level of skills in the study population. Due to that the possibility of getting an

employment is less when the qualification is low. The significance of lower income among the study cohort is the reason for not sustaining the cost of diabetes medication.

In present study lack of awareness to take medication was another reason for the treatment interruption which may be due to the forgetfulness to take the medicine on time. In agreement to this study done by Lawton et al, who found that non-adherence was more related to patient forgetfulness than to specific concerns about medications or interaction with the physicians.¹⁵

Support from family play a crucial role in diabetes management. Family members function as counselors encouraging diet and exercise behaviors. Family members facilitate adherence with medication, and altogether helping patients to win with diabetes.¹⁶ In present study more than a quarter patients responded that they missed the visit to the physician as there was no one to accompany them. In previous study by Awodele et al, who also reported that taking medicine alone was the one of the risk factor for the poor adherence among the diabetes patients.¹² Out of 200, 140(70%) majority of the patients in present study were not aware of the consequences of missing the doses this may be due to the higher illiteracy rates among the study population. Education is the key component for the management of diabetes. Previous studies have also highlighted the importance of need of information related to consequences of missing the dose.¹² Hence it is very important to inform the patients about their disease and medication. It is also important to educate the person accompanying the patients regarding the information on missing the dose. However few previous studies which have found no relation of education on improving self- management skills and psychosocial competencies in diabetes patients.^{14,18}

Risk factors for poor adherence can be distinguished as unmodifiable factors such as age and sex and factors such as education, financial difficulties and presence of professional activity can be hardly modified in contest to medical relationship. There are some modifiable risk factors such as family support, lack of information related to medication, and poor acceptability of medical recommendations on which treating physician could focus more in order to improve the medications adherence and in result could improve the glycaemic control.

Present study had few limitations; one was the use of self-reported data on the risk factors of treatment interruptions or medication adherence. However, majority of the previous studies have used self-reported questionnaires as they are low in cost and time expenditure. Self-reported questionnaires are also appropriate for the large population based sample. Previous report have also found the self- reported questionnaires provide a reasonably accurate

estimate of adherence among the diabetes patients.¹⁹ Lastly this was a cross sectional study because of that authors can-not apply the present study findings to large population. However a large randomized control trial is required to provide the strength to present study findings.

Conclusion

For effective diabetes management medication adherence plays a very important role. Authors found a low level of medication adherence among the study population. These findings highlight the importance of improving the physicians approach on the modifiable risk factors on individual basis. However, it is the patients and their family who play a vital role in the diabetes management. It is very important to develop knowledge and appropriate skills by the patients; also behavioral change is very important. To conclude it is very important to identify the patients with poor adherence in order to improve the factors responsible. By improving the risk factors for the poor adherence on individual basis better outcome can be obtained in terms of better glycemic control among the diabetes patients.

References

1. Khardori R, Griffing TG. Essentials of Type 2 Diabetes Mellitus and Its Adherence. *J Anal Bioanal Tech.* 2014;12(6):1-3.
2. Riaz M, Basit A, Fawwad A, Yakoob M, Rizvi ZA. Factors associated with non-adherence to Insulin in patients with Type-1 diabetes. *Pak J Med Sci.* 2014;30(2):233-9.
3. Royle R, Walsh M, Smeltzer Y, Bare M. A Study on Type I and Type II Diabetes Mellitus. *BioMed Research International.* 2006;48(6):1-9.
4. Kempin C M. Adherence to Diabetic Medication. *D and E.* 2017;22(2):1-5.
5. Riaz M, Bukhsh A, Iqbal HM, Ali R, Baig MA, Khalid M. Factors Affecting the Compliance with Insulin use in Diabetic Patients of Tertiary Care Hospitals of Lahore. *Pharm Sci and Res.* 2014; 6(4):191-4.
6. He X, Chen L, Wang K, Wu H, Wu J. Insulin adherence and persistence among Chinese patients with type 2 diabetes: a retrospective database analysis. *doi. org.* 2017;11(1):237-45.
7. Raut MS, Balasubramanian J, Anjana RM, Unnikrishnan R, Mohan V. Adherence to insulin therapy at a tertiary care diabetes center in South India. *Journal of Diabetology.* 2014;1(4):1-5.
8. Baghianimoghadam, Mohammad H, Afkhami-Ardekani M. Effect of Education on Improvement of Quality of Life by SF-20 in Type 2 Diabetic Patients. *MiddleEast*

- Journal of Scientific Research. 2008;3(2):67-72
9. Van Bruggen R, Gorter K, Stolk RP, Zuithoff P, Klungel OH et al. Refill adherence and polypharmacy among patients with type 2 diabetes in general practice. *Pharmacoepidemiol Drug Saf.* 2009;18(11):983-91.
 10. Pollack MF, Purayidathil FW, Bolge SC, Williams SA. Patient-reported tolerability issues with oral antidiabetic agents: Associations with adherence; treatment satisfaction and health-related quality of life. *Diabetes Res Clin Pract.* 2010;87(2):204-10.
 11. Ascher-Svanum H, Lage MJ, Perez-Nieves M, Reaney MD, Lorraine J, Rodriguez A et al. Early Discontinuation and Restart of Insulin in the Treatment of Type 2 Diabetes Mellitus. *Diabetes Ther.* 2014;5(1):225-42.
 12. Awodele O, Osuolale JA. Medication adherence in type 2 diabetes patients: study of patients in Alimosho General Hospital, Igando, Lagos, Nigeria. *African Health Sciences.* 2015;15(2):513-22.
 13. Mojtabai R, Olfson M. Medication Costs, Adherence and Health Outcomes Among Medicare Beneficiaries. *Health Aff.* 2003;22(4):220-9.
 14. Tiv M, Viel J-F, Mauny F, Eschwege E, Weill A, et al. Medication Adherence in Type 2 Diabetes: The ENTRED Study 2007, a French Population- Based Study. *PLoS One.* 2012;7(3):e32412.
 15. Lawton J, Peel E, Parry O, Douglas M. Patients' perceptions and experiences of taking oral glucose- lowering agents: a longitudinal qualitative study. *Diabet Med.* 2008;25(4):491-5
 16. Mosnier-Pudar H, Hochberg G, Eschwege E, Virally ML, Halimi S et al. How do patients with type 2 diabetes perceive their disease? Insights from the French diabasis survey. *Diabetes Metab.* 2009;35(3):220-7.
 17. Cegala DJ, Marinelli T, Post D. The effects of patient communication skills training on compliance. *Arch Fam Med.* 2000;9(1):57-64.
 18. Magadza C, Radloff SE, Srinivas SC. The effect of an educational intervention on patients' knowledge about hypertension, beliefs about medicines, and adherence. *Res Social Adm Pharm.* 2009;5(4):363- 75.
 19. Garber MC, Nau DP, Erickson SR, Aikens JE, Lawrence JB. The concordance of self-report with other measures of medication adherence: a summary of the literature. *Med Care.* 2004;42:649-52