Original Article

Poor Glycemic Control in Patients with Type-II Diabetes and Factors Leading to Poor Glycemic Control

Naveed-ul-Zafar, Amna Saeed, Tahir Bashir, Tahira Liaquat, Bilal Azeem Butt and Awais Abid

Objective: To determine the frequency of poor glycemic control in patients with type-II diabetes. Factors leading to poor glycemic control in patients with type II diabetes

Methods: A total of 370 patients presenting in out-patients department of Medicine, Services Hospital Lahore were recruited in the study. After informed consent, history and physical examination of all the patients was done. After overnight (minimum 8 hours) fasting, HbA1c sample was sent to the hospital laboratory. Glycemic Control of patients was recorded and possible factors affecting glycemic control like family history and low physical activities were recorded.

Results: In our study, out of 370 cases, 39.73%(n=147) were between 30-50 years of age whereas 60.27%(n=223) were between 51-70 years of age. 48.92%(n=181) were male while 51.08%(n=189) were females. Poor glycemic control was recorded in 61.08%(n=226) whereas 38.92%(n=144) had good glycemic control. Frequency of factors leading to poor glycemic control in patients with type II diabetes shows that out of 226 cases, family history was recorded in 63.72%(n=144) whereas 90.27%(n=204) had low physical activity.

Conclusions: We concluded that the frequency of poor glycemic control is higher in patients with type-II diabetes and low physical activities and family history are the major factors leading to poor glycemic control.

Keywords: Type-II diabetes, poor glycemic control, factors, low physical activity, family history

Introduction

Type 2 Diabetes Mellitus (T2DM) is a leading cause of morbidity worldwide, especially with increasing prevalence in developing countries.[1] Recent epidemiological reports indicated an increased prevalence of Type-2 diabetes in Turkey (7.2%), India (8.2%), Pakistan (11.1%), and Hawaii (20.4%). It is estimated that the developing countries will bear the brunt of diabetes epidemics in the 21st century.[2]

In 2011 the Diabetes Atlas of the International Diabetes Federation (IDF) estimated the global DM prevalence in the age group 20-79 years at 8.3%, which translates into 366.2 million people suffering from DM in 2011. The number of people living with DM is projected to reach 551.9 million by 2030. By 2030 Bangladesh is likely to emerge as the 8th highest ranking country in terms of the number of people with DM.[3]Poor and inadequate glycemic control among patients with Type 2 diabetes constitutes a major public health problem and major risk factor for the development of diabetes complications. Glycemic control remains the major therapeutic objective for prevention of target organ damage and other complications arising from diabetes.[4]

The definition of intensive glycaemic control varies among trials and guidelines. The ACCORD trial and the Veterans Affairs Diabetes Trial (VADT) used a target of glycatedhaemoglobin A1c (HbA1c) below 6.0% for intensive glycaemic control compared with a target of HbA1c below 6.5% in the Action in Diabetes and Vascular DiseasePreterax and Diamicron Modified Release Controlled Evaluation (ADVANCE) trial. The results from these trials have created a debate about the optimal choice of glycaemic target. The American Diabetes Association recommends an HbA1c level of less than 7.0% as the standard glycaemic treatment goal, whereas the International Diabetes Federation recommends a level of less than 6.5%.[5-7]A recent study[2] recorded 60% of the diabetic cases with poor glycemic control (>7HbA1c), another recent study recorded 78.6% of the cases with poor glycemic control.[8] A previous study[9] revealed that poor glycemic control was 96.4% of the cases with low physical activities. Patients with positive family history of diabetes mellitus had 24.6% poor glycemic control while those without family history was recorded in 75.4%.[10]

Physical activity is one of the important therapeutic measures to lower blood glucose in type 2 diabetes due to its synergistic action with insulin in insulin-sensitive tissues.[11]Another study on predictors of poor glycemic control in type 2 diabetics shows that female gender,

High body mass index and poor drug compliance significantly associated with poor glycemic control.[12]

Patients with T2DM should perform at least 150 minutes per week of moderate to intense aerobic exercise, while resistance exercise should be performed at least three times a week, according to guidelines.[13-14] The rationale of the study is that the above studies are significantly different regarding poor glycemic control in diabetics while no recent data in our population is recorded, as we are receiving a great number of patients with poor glycemic control which needs to be recorded, the results of our study will be helpful to know the recent and exact frequency of poor glycemic control and factors affecting it. Furthermore, it will also be helpful for creating awareness regarding glycemic control in diabetics.

Methods

A total of 370 patients presenting to out patients department of Medicine, Services Hospital Lahore were recruited in the study. An informed consent of the patients was taken. History and physical examination of all the patients was taken. After overnight (minimum 8 hours) fasting, 5 ml of whole blood was collected from diabetic patients with all aseptic precautions, using a 5 cc disposable syringe at fasting without oral hypoglycemic drug or insulin as they were prescribed earlier. The sample was sent to the hospital laboratory to record HbA1c. Glycemic control (according to operational definition) of patients was recorded on the basis of HbA1c (normal value 7.5%) and factors leading to it e.g. family history and low physical activities were also recorded. The level of physical activity is monitored using the International Physical Activity Questionnaire (IPAQ) to obtain reliable conclusions and can be classified into low, moderate and high physical activity. Information was recorded on a pre-designed proforma (Annexure).

The data was entered and computed on SPSS-14. Frequency and percentages were calculated for gender, glycemic control, factors of poor glycemic control like low physical activiy and family history. chi-square test was applied for any significant difference. P-value of ≤0.05 was considered statistically significant.

Results

A total of 370 patients were enrolled to determine the frequency of poor glycemic control in patients with type-II diabetes and factors leading to poor glycemic control in patients with type II diabetes. Age distribution of the patients shows that 39.73% (n=147) were between 30-50 years of age whereas 60.27% (n=223) were between 51-70 years of age, mean±sd was calculated as 51.66+8.98 years. **(Table-1).** Gender distribution shows that 48.92% (n=181) were male while 51.08% (n=189) were females. **(Table-2).** Poor glycemic control was recorded in 61.08% (n=226) whereas 38.92% (n=144) had good glycemic control. **(Table-3)** Frequency of factors leading to poor glycemic control in patients with type II diabetes shows that out of 226 cases, family history was recorded in 63.72% (n=144) whereas 90.27% (n=204) had low physical activity. (**Table- 4).**

Table-1: Age distribution (n=370).

Age (Years)	No of Patients	Percentage
30-50	147	39.73%
51-70	223	60.27%
Total	370	100.0%
Mean±SD	351.66±8.98	

Table-2: Sex distribution (n=370).

Sex	No of Patients	Percentage
Male	181	48.92%
Female	189	51.08%
Total	370	100.0%

Table-3: Presence/absence of poor glycemic control (n=370).

Poor glycemic control	No of Patients	Percentage
Yes	226	61.08%
No	144	38.92%
Total	370	100.0%

Table-4: Poor glycemic control in patients with type-II diabetes and risk factors (n=226).

Factors leading to poor glycemic control	No of Patients	Percentage
Family history	144	63.72%
Low physical activity	204	90.27%

Discussion

Diabetes mellitus (DM) is a major public health problem worldwide that requires continuing medical care and ongoing patient self-management, education and support to prevent acute complications and to reduce the risk of long-term complications. American Diabetes Association (ADA) regards glycemic control as one of the important strategies for the management

of DM, and glycosylated hemoglobin (A1C) is the best measure of glycemic level over the previous 3 months. Lowering hemoglobin A1C to below or around 7% has shown to reduce microvascular complications of diabetes and if implemented soon after the diagnosis of diabetes, is associated with long-term reduction in macrovascular disease. The ADA recommends a goal of A1C less than 7% for people with DM. There is a recent study[2] which recorded 60% of the diabetic cases with poor glycemic control (>7HbA1c), findings are in agreement with this study, whereas another study recorded 78.6% of the cases with poor glycemic control.[8] These findings are slightly higher than ours. Another previous study[9] revealed that poor glycemic control was 96.4% of the cases with low physical activity. Patients with positive family history of diabetes mellitus had 24.6% poor glycemic control while those without family history was recorded in 75.4%,[10] these findings support our results. Another study[15] assessed the status of glycemic control and its contributing factors among adult patients with type 2 diabetes mellitus. They concluded that majority of patients had poor glycemic control. Patients with low level of education, being employed, on combinations of insulin and oral medication, and lower adherence to their medication, were likely to have poor glycemic control. Education and awareness creation could be a cross cutting intervention for the significant factors, however, it was not our study variable. Guidelines recommend that patients with T2DM should perform at least 150 minutes per week of moderate to intense aerobic exercise, while resistance exercise should be performed at least three times a week.[16-17] In a study, only a small percentage of patients with T2DM were doing regular physical activity and specific exercise. However, there were no statistically significant differences between patients who did not perform regular physical activity in terms of glycemic control and those who were participating in regular physical exercise. The lack of association between physical exercise and glycemic control in this study is in contrast with the findings by Empierre et al,[16] probably due to the small number of patients who were performing regular physical activity in this study. This study showed that previous data reveal significantly different magnitude regarding poor glycemic control in diabetics while no recent data in our population is recorded, as we are receiving a great number of patients with poor glycemic control which needs to be recorded, the results of our study will be helpful to know the recent and exact frequency of poor glycemic control in T2DM and factors contributing to it.

Conclusion

The frequency of poor glycemic control is higher in patients with type-II diabetes and low physical activity and family history are the major factors leading to it. It will be helpful for creating awareness regarding glycemic control in diabetics with poor glycemic control.

Department of Endocrinology
SIMS/Services Hospital, Lahore

www.esculapio.pk

References

1. Yousefzadeh G, Shokoohi M, Najafipour H. Inadequate control of diabetes and metabolic indices among diabetic patients: A population based study from the Kerman Coronary Artery Disease Risk Study (KERCADRS). Int J Health Policy Manag 2015, 4(5), 2717.
2. Siddiqui SRA, Rahman MZ, Alamj ASMT Hoque M, Glycemic control in type 2 diabetes mellitus patients. ChattMaa Shi Hosp Med Coll J 2013;12(1):4-8.
3. Whiting DR, Guariguata L, Weil C, Shaw J. IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. Diabetes Res Clin Pract 2011;94(3):31121.
4. Khattaba M, Khaderb YS, Al-Khawaldehd A, Ajlouni K. Factors associated with poor glycemic control among patients with Type 2 diabetes. Journal of Diabetes and Its Complications 2010;24:849.
5. American Diabetes Association. Standards of medical care in diabetes2010. Diabetes Care 2010;33(suppl 1):S11-61.
6. International Diabetes Federation. Global guideline for type 2 diabetes: recommendations for standard, comprehensive, and minimal care. Diabet Med 2006;23:579-93.
7. Nathan DM, Buse JB, Davidson MB, Ferrannini E, Holman RR, Sherwin R, et al. Medical management of hyperglycaemia in type 2 diabetes mellitus: a consensus algorithm for the initiation and adjustment of therapy: a consensus statement from the American Diabetes Association and the European Association for the Study of Diabetes. Diabetologia 2009;52:17-30.
8. Gopinath B, Sri Sai Prasad M, Jayarama N, Prabhakara K. Study of factors associated with poor

glycemic control in Type-2 Diabetic patients. GJMEDPH 2013;2:1-5.
9. Almutairi MA, Said S, Zainuddin H. Predictors of Poor Glycemic Control Among Type Two Diabetic Patients. American Journal of Medicine and Medical Sciences 2013, 3(2):17-21.
10. Kassahun T, Eshetie T, Gesesew H. Factors associated with glycemic control among adult patients with type 2 diabetes mellitus: a cross-sectional survey in Ethiopia. BMC Research Notes20169:78.
11. Caro, J. F., L. G. Dohm, W. J. Pories, and M. K. Sinha. Cellular alterations in liver, skeletal muscle, and adipose tissue responsible for insulin resistance in obesity and type 2 diabetes. Diabetes/Metab. Rev 1989;5:66589.
12. Demoz GT1, Gebremariam A2, Yifter H3, Alebachew M4, Niriayo YL5, Gebreslassie G6, et al. Predictors of poor glycemic control among patients with type 2 diabetes on follow-up care at a tertiary healthcare setting in Ethiopia.BMC Res Notes. 2019 Apr 4;12(1):207. doi: 10.1186/s13104-019-4248-6.
13. Umpierre D, Ribeiro PA, Kramer CK, Leitão CB, Zucatti AT, Azevedo MJ, et al. Physical activity advice only or structured exercise training and association with HbA1c levels in type 2 diabetes: a systematic review and meta-analysis. JAMA. 20114; 305(17):1790-9.
14. Colberg SR, Sigal RJ, Fernhall B, Regensteiner JG, Blissmer BJ, Rubin RR,et al. American College of Sports Medicine., American Diabetes Association. Exercise and type 2 diabetes: the American College of Sports Medicine and the American Diabetes Association: joint position statement. Diabetes Care. 2010 Dec; 33(12):e147-67.
15. Kassahun T, Eshetie T, Gesesew H. Factors associated with glycemic control among adult patients with type 2 diabetes mellitus: a cross-sectional survey in Ethiopia. BMC Research Notes. 2016;9:78.
16. Umpierre D, Ribeiro PA, Kramer CK, Leitão CB, Zucatti AT, Azevedo MJ, Gross JL, Ribeiro JP, Schaan BD. Physical activity advice only or structured exercise training and association with HbA1c levels in type 2 diabetes: a systematic review and meta-analysis. JAMA. 20114; 305(17):1790-9.
17. Colberg SR, Sigal RJ, Fernhall B, Regensteiner JG, Blissmer BJ, Rubin RR, Chasan-Taber L, Albright AL, Braun B, American College of Sports Medicine., American Diabetes Association. Exercise and type 2 diabetes: the American College of Sports Medicine and the American Diabetes Association: joint position statement. Diabetes Care. 2010 Dec; 33(12):147-67.