Original Article

Causes of death in hospitalized diabetic patients in a tertiary hospital of Bangladesh

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ABSTRACT

Background: *The incidence of diabetes mellitus is on a constant rise, affecting children and the elderly alike. This incidence is presumed to rise even further in the next few decades. Diabetes is often associated with various cardiovascular and kidney-related comorbidities, which can greatly affect the life expectancy. The comorbidities often have a direct influence on the mortality rate. The present study was conducted to find out the cause of death among hospitalized diabetic patients.*

Methods: *This retrospective study was conducted Medicine and allied departments of BIRDEM General Hospital, Dhaka, Bangladesh. The study period was July 2020 to June 2021 and the study was conducted with the data of 75 patients. Data was collected from hospital records by retrieving the files with proper permission from hospital authority. Patients whose cause of death was due to traumatic injury unrelated to diabetes and cases where investigation reports were not available were excluded from the study. Ethical approval was obtained from the ethical review committee of Bangladesh Diabetic Association.*

Results: *Among the study subjects, 38.7% were older than 70 years, 30.7% between 61-70 years and only 4% between 23-40 years. Mean age was 65.3±13.2 years. There was slight male predominance, with male: female ratio 1.3:1. Clinical presentation included fever (60%)and shortness of breath (49.3%). Hypertension was the most common comorbidity (92%), followed by chronic obstructive pulmonary disease (18.7%) and acute kidney injury on chronic kidney disease (37.3%). The most common cause of death was urosepsis (30.7%) followed by septic shock (13.3%), myocardial infarction (12%) and the least common cause was meningoencephalitis (1.3%).*

Conclusion: *The study found that the most common cause of death in diabetic patients was sepsis, specifically urosepsis, followed by renal failure and cardiovascular disease related ailments.*

Key words: *diabetes mellitus, mortality, sepsis, cardiovascular diseases.*

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INTRODUCTION

Diabetesmellitus is a metabolic disorder characterized by chronic or persistent hyperglycemia, due to defect in insulin secretion, insulin action or both. When the blood glucose level increases, the body releases insulin, which works as a doorway for the blood glucose to enter into the cells and be used as energy.[1,2] Diabetes is increasingly becoming more and more common each day. Just in the last 2 decades, the incidence of diabetes among the general population has increased by twofold.[3]Especially, type 2 diabetes mellitus has been showing an alarming rise among many Asian countries like China, India, Indonesiaand Bangladesh.[4] Diabetes is even more dangerous as it is often accompanied by associated complications, like hypertension, dyslipidemia, etc.[5,6]Diabetes has various associated diseases, that can greatly impact day-to-day life and may even cause death. One of the most common comorbidities of diabetes is hypertension. Up to 75% of diabetic individuals also have hypertension and those with hypertension alone frequently exhibit signs of insulin resistance.[7] Due to this, hypertension and diabetes are often seen as intertwined complications. Some of the other common comorbidities of diabetes are obesity, hyperlipidemia, kidney disease and cardiovascular disease.[8] Obesity, however, is often seen as a risk factor of diabetes, rather than comorbidity.[9-11]Diabetes has significantly high morbidity and mortality rate and this only keeps increasing each day. The rise is most likely to be significant in emerging nations experiencing the fastest economic expansion.[12]As diabetes has been increasingly affecting the underaged population, since the advent of insulin in 1922, the treatment of children with type 1 diabetes mellitus has improved substantially. But despite such advancements, significant morbidity and mortality still remains.[13]Death is due to acute or chronic complications of diabetes. Cardiovascular complications are presumed to be the commonest cause of mortality. Unfortunately there is scanty data in our country regarding the cause of death in diabetic patients. The present study was conducted with the goal of evaluating the underlying cause of death among hospitalized diabetic patients.

METHODS

This retrospective study was conducted at the Department of Internal Medicine and allied specialities of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Diseases (BIRDEM) General Hospital, Dhaka, Bangladeshfrom July 2020 to June 2021. Seventy fivepatients, who were older than 20 years, who died in hospital while admitted were included.Patients whose cause of death was due to traumatic injury unrelated to diabetes and cases where pertinent investigations were not available were excluded from the study. Ethical approval was obtained from the ethical review committee of Bangladesh Diabetic Association. All necessary data were collected and recorded from hospital records and were analyzed by the SPSS software.

RESULTS

Total 75 death cases were evaluated including 43 (57.3%) males. Mean age was65.3±13.2 years and most (38.7%) were over 70 years. Age distribution is shown in Table I. Fever and shortness of breath were the two most common presentations. Other are presented in Table II. Common comorbidities were hypertension (69, 92%), chronic obstructive pulmonary diseases (COPD) (14, 18.7%), acute kidney injury (AKI) on chronic kidney disease (CKD) (28, 37.3%). Other are shown in Table III.

Table I Age distribution of the study subjects (N=75)

Age group	Frequency	Percentage
23-40	3	4.0
41-50	5	6.7
51-60	15	20.0
61-70	23	30.7
>71	29	38.7
Total	75	100.0
Mean±SD	65.3±13.2	

Table II Presenting symptoms of the cases (N=75)

Symptom	Frequency	Percentage
Fever	45	60.0
Cough	7	9.3
Shortness of breath	37	49.3
Diarrhea	1	1.3
Vomiting	2	2.6
Fatigue	1	1.3
Anorexia	6	8
Nausea	7	9.3
Myalgia	1	1.3
Chest-pain	7	9.3
Dizziness	1	1.3
Headache	1	1.3
Abdominal pain	1	1.3
Burning micturition	8	10.7
Altered level of consciousness	14	18.7

Table III Distribution of subjects by presenting comorbidities (N=75)*

Comorbidity	Frequency	Percentage
Hypertension	69	92.0
Chronic obstructive pulmonary disease	14	18.7
Bronchial asthma	1	1.3
Acute kidney injury (AKI)	14	18.7
Chronic kidney disease (CKD)	8	10.7
AKI on CKD	28	37.3
End-stage renal disease on maintenance haemodialysis	3	4.0
Hypothyroidism	1	1.3
Atrial fibrillation	1	1.3
Ischemic heart disease	9	12.0

*Multiple response elicited

The most common cause of death was infection, followed by cardiovascular diseases and malignancy. Among all causes, urosepsis was in leading position (23, 30.7%). Other causes are shown in Table IV.

Table IV Cause of death among the study subjects (N=75)

Cause of Death	Frequency	Percentage
Urosepsis	23	30.7
Myocardial infarction	9	12.0
Septic shock	10	13.3
Pneumonia	5	6.7
Acute pancreatitis	3	4.0
Hepatic failure	8	10.7
Renal failure	5	6.7
Meningoencephalitis	1	1.3
Acute left ventricular failure	5	6.7
Decompensated chronic liver disease with portal hypertension	3	4.0
Malignancy with metastasis	3	4.0

DISCUSSION

Diabetes is the body's inability to either produce or manage insulin supply in the body, leading to an increase in the blood glucose level. It is a chronic health condition that affects over 415 million people globally and the incidence has been observed to be highest in the middle developing and underdeveloped world.[14] Various studies have found that the mortality rate of diabetes-affected patients is significantly higher, compared to those who do not have diabetes.[15-17] This relation between the mortality rates and diabetes incidence varies between different regions and localities and the primary cause of death also varies based on the habitat.[18,19] Very few studies have been conducted on the cause of death among diabetic patients. In the present study, we aimed to observe the cause of death among diabetic patients, who were hospitalized due to the severity of their ailments prior to their death. In the present study, almost 70% of the deceased were over the age of 60 years. This high mortality rate among the elderly is quite common worldwide and some studies have a higher mortality rate among the older population compared to our participants.[20,21] 20% of the present study participants died between the age of 51-60 years, which was much less than the average life expectancy of 72.59 years in Bangladesh.[22] This finding is supported by the findings of a US research study, where it was observed that

diabetes decreases life expectancy by about 8.5 years.[23] High blood pressure, kidney disease, cardiac disease are some of the causes of shorter life expectancy among diabetic patients.[24] The mean age of the present study participants was 65.34±13.23 years. Male prevalence was slightly higher in the present study, and the male-to-female ratio was 1.3:1.

In the present study, the most common symptoms among the admitted patients were fever and shortness of breath. Cough and nausea were some of the less common symptoms. Fatigue, headache, dizziness and similar symptoms were observed in a minimum number of patients. Among the comorbidities, 74 participants had normal thyroid gland function, and only 1 patient had the hypothyroidism. Around 70% of the participants had some form of kidney disease, 20% had respiratory problems and 14.6% had cardiac status ailments. Hypertension, obesity and chronic kidney disease are some of the common comorbidities among diabetes patients globally, which was also observed in our study.[25] Cardiovascular comorbidities are also common in some parts of the world, but in our study, only 14.6% had cardiac comorbidities.[26] Among the 75 deceased patients, the most common cause of death was sepsis from an infection in the urinary tract, with an incidence rate of 30.7%. Septic shock and myocardial infarction were the primary cause of death for 13.3% and 12% of cases respectively. Myocardial infarction has been recognized as a significant risk factor and cause of death among various studies focusing on diabetic patients.[27] But the incidence was much less compared to urosepsis cases in our study. Renal failure, hepatic failure, pneumonia, etc. had less than 10 cases among the study participants. This was different from the findings of a study by Hansen, where renal failure and ischemic heart disease had a much higher incidence rate as a cause of death.[28]

Limitations

The study was conducted in a single hospital with a small sample size. As it was done in a tertiary care hospital and in medical wards, many cardiac cases were not included here. So, the results may not represent the whole community. Also, due to lack of relevant data, many patients could not be included in the study, which may have further influenced the results.

Conclusion

In contrary to the previous knowledge where cardiovascular diseases are the most common cause of death in diabetic patients, this study indicates that sepsis, specifically urosepsis is the major cause of death in diabetic patients in our country. However, further large scale study is needed to clarify the scenario and to find out possible explanations.

REFERENCES

1. What is diabetes? [Internet]. Centers for Disease Control and Prevention. Centers for Disease Control and Prevention; 2021 [cited 2021, Dec8].

2. Diabetes overview [Internet]. Diabetes Symptoms, Causes, & Treatment | ADA. [cited 2021, Dec8].

3. Zimmet PZ, Magliano DJ, Herman WH, Shaw JE. Diabetes: a 21st century challenge. The Lancet Diabetes & Endocrinology 2014 Jan 1;2(1):56-64.

4. Ramachandran A, Ma RC, Snehalatha C. Diabetes in Asia. The Lancet 2010 Jan 30;375(9712):408-18.

5. Atlas ID. International Diabetes Federation. IDF Diabetes Atlas. Brussels, Belgium: International Diabetes Federation; 2017.

6. Chen L, Magliano DJ, Zimmet PZ. The worldwide epidemiology of type 2 diabetes mellitus—present and future perspectives. Nature Reviews Endocrinology 2012 Apr;8(4):228-36.

7. Long AN, Dagogo-Jack S. Comorbidities of diabetes and hypertension: mechanisms and approach to target organ protection. J Clin Hypertens (Greenwich). 2011;13(4): 244-251.

8. Prevalence of comorbidities high in type 2 diabetes [Internet]. Healio. [cited 2021Dec8].

9. Hossain P, Kawar B, El Nahas M. Obesity and diabetes in the developing world—a growing challenge. N Engl J Med. 2007;356(3):213-215.

10. Lazar MA. How obesity causes diabetes: not a tall tale. Science 2005 Jan 21;307(5708):373-5.

11. Leong KS, Wilding JP. Obesity and diabetes. Best Practice & Research Clinical Endocrinology & Metabolism 1999 Jul 1;13(2):221-37.

12. Dowse GK, Gareeboo H, Zimmet PZ, Alberti KG, Tuomilehto J, Fareed D, et al. Mauritius Noncommunicable Disease Study Group. High prevalence of NIDDM and impaired glucose tolerance in Indian, Creole, and Chinese Mauritians. Diabetes 1990 Mar 1;39(3):390-6.

13. Scibilia J, Finegold D, Dorman J, Becker D, Drash A. Why do children with diabetes die?. European Journal of Endocrinology1986 Dec 1;113(4_Suppl):S326-33.

14. Jaacks LM, Siegel KR, Gujral UP, Narayan KV. Type 2 diabetes: A 21st century epidemic. Best Practice & Research Clinical Endocrinology & Metabolism 2016 Jun 1;30(3):331-43.

15. Dawson SI, Willis J, Florkowski CM, Scott RS. Cause-specific mortality in insulin-treated diabetic patients: a 20-year follow-up. Diabetes Res Clin Pract. 2008;80(1):16-23..

16. Guzder RN, Gatling W, Mullee MA, Byrne CD. Early mortality from the time of diagnosis of type 2 diabetes: a 5 year prospective cohort study with a local age and sex matched comparison cohort. Diabetic Medicine 2007 Oct;24(10):1164-7.

17. Jansson SP, Andersson DK, Svärdsudd K. Mortality trends in subjects with and without diabetes during 33 years of follow-up. Diabetes Care 2010 Mar 1;33(3):551-6.

18. Morrish NJ, Wang SL, Stevens LK, Fuller JH, Keen H. Mortality and causes of death in the WHO Multinational Study of Vascular Disease in Diabetes. Diabetologia 2001 Sep;44(2):S14-21.

19. Patterson CC, Dahlquist G, Harjutsalo V, Joner G, Feltbower RG, Svensson J, et al. Early mortality in EURODIAB population-based cohorts of type 1 diabetes diagnosed in childhood since 1989. Diabetologia 2007 Dec;50(12):2439-42.

20. Gu K, Cowie CC, Harris MI. Mortality in adults with and without diabetes in a national cohort of the US population, 1971–1993. Diabetes Care 1998 Jul 1;21(7):1138-45.

21. Panzram G, Zabel-Langhennig R. Prognosis of diabetes mellitus in a geographically defined population. Diabetologia 1981 Jun;20(6):587-91.

22. Life expectancy at birth, total (years) - Bangladesh [Internet]. The World Bank. the world bank org; [cited 2021Dec12].

23. Hendrick B. Diabetes cuts years off life span of Americans [Internet]. WebMD. WebMD; 2010 [cited 2021Dec12].

24. What causes a shorter life expectancy in diabetics? [Internet]. Diabetes.co.uk The global diabetes community. 2020 [cited 2021Dec12].

25. Iglay K, Hannachi H, Joseph-Howie P, Xu J, Li X, Engel SS, et al. Prevalence and co-prevalence of comorbidities among patients with type 2 diabetes mellitus. Curr Med Res Opin. 2016;32(7):1243-1252.

26. Robbins JM, Webb DA, Sciamanna CN. Cardiovascular comorbidities among public health clinic patients with diabetes: the Urban Diabetics Study. BMC Public Health 2005 Dec;5(1):1-9.

27. Hanefeld M, Fischer S, Julius U, Schulze J, Schwanebeck U, Schmechel H, et al. Risk factors for myocardial infarction and death in newly detected NIDDM: the Diabetes Intervention Study, 11-year follow-up. Diabetologia1996 Nov;39(12):1577-83.

28. Hansen MB, Jensen ML, Carstensen B. Causes of death among diabetic patients in Denmark. Diabetologia 2012 Feb;55(2):294-302.