

COMPARATIVE ANALYSIS OF ASSOCIATED COMPLICATIONS OF TYPE-1 AND TYPE-2 DIABETES MELLITUS

Hamzullah Khan, Nadeem Jan, Akber Khan Afridi

Department of Community Medicine,
Khyber Medical College Peshawar

ABSTRACT

Objective: To analyse the associated complications of Type-1 and Type-2 diabetes mellitus in two tertiary care hospitals of Peshawar.

Material and Methods: A comparative cross sectional observational study was conducted at Khyber teaching hospital and Lady Reading hospital, Peshawar from January 2004 to February 2005. A total of 532 diagnosed patients of diabetes mellitus who had developed further complications were included. Patients were interviewed according to a pre-designed questionnaire.

Results: Out of 532 patients, 437 (82.1%) were Type-2 diabetics and 95 (17.9%) were Type-1 diabetics. Two hundred and seventy eight (52.25%) were females and 254 (47.74%) were males. Two hundred and seventy six (60.33%) patients had more than 10 years of duration of diabetes. The common complications in type-2 diabetics were coronary artery disease (CAD) in 268 (49.81%) cases, cerebrovascular accidents in 61 (11.46%) cases and diabetic ulcers in 59 (11.09%) cases. In type-1 diabetics, common complications were cardiovascular diseases in 38 (7.14%) cases, surgical ulcers in 16 (3%) cases, neuropathies in 15 (2.81%) cases and nephropathy in 9 (1.69%) cases. Type-2 diabetes coexists with hypertension in 112 (36.60%) cases of CAD and 31 (46.26%) cases of CVA cases.

Conclusion: The frequency and morbidity of Type 2 diabetes is more common than Type 1 diabetes in our selected patients.

Key Words: Type-1 Diabetes Mellitus, Type-2 Diabetes Mellitus, Complications, Cerebrovascular Accident, Coronary Artery Disease, Neuropathy, Nephropathy, Peshawar

INTRODUCTION

Diabetes Mellitus (DM) is a risk factor for coronary artery diseases and stroke, and is the most common cause of amputation that is not the result of an accident. Worldwide only 10.15% of the cases are Type-1 diabetics and 85-90% are Type-2 diabetics.¹ Type 1 diabetes causes nephropathy, proliferative retinopathy, renal failure and neuropathy. It usually follows a juvenile onset and the mortality, renal failure, and neuropathy chances increases in younger age i.e. 20 to 30 years.² According to WHO report 2004 the prevalence of diabetes is 5-9.9% in Pakistan and India, 10-14.9% in Greece, 15% or above in Qatar and below 5% in China.³ Type 1 diabetes is now known to be an autoimmune disease. For unknown reasons, the patient's immune system destroys its own pancreatic insulin-producing beta cells. The hallmark of type-2 diabetes is insulin resistance,

which may be mediated by one of a number of gene defects. At some point, the pancreatic beta cells are unable to compensate for the insulin resistance by increasing insulin secretion leading to Type 2 diabetes.⁴

Atherosclerosis and arteriosclerosis are more common in diabetes than non-diabetics usually in age 40 or above. Endothelial dysfunction contributes to cardiovascular diseases, including hypertension, atherosclerosis, and coronary artery disease, which are also characterized by insulin resistance. Insulin resistance is a hallmark of metabolic disorders, including type 2 diabetes mellitus and obesity, which are also characterized by endothelial dysfunction.⁵ Diabetic foot is more common in type 2 diabetes. Males are more affected, the patient usually had more than ten years duration of the disease.⁶ Urinary tract infections are also

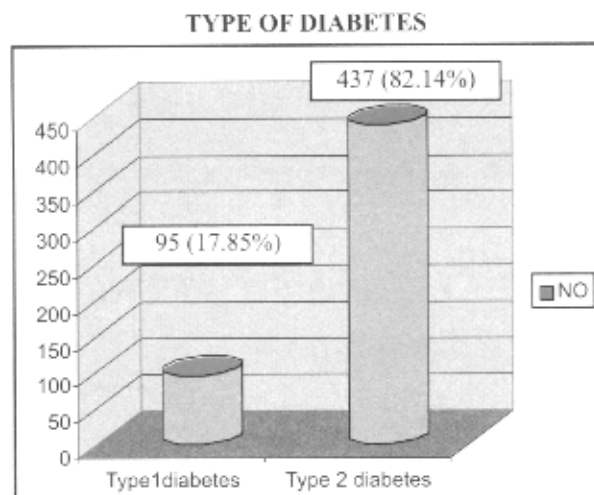


FIGURE-I

common in diabetics. Glomerulosclerosis is a main manifestation of diabetes and is related to the duration of the disease rather than its severity and appears within 15-20 years after the disease has progressed.⁷

This study was conducted to analyze comparatively the associated complications of Type-1 and Type-2 diabetes in two tertiary care hospitals of Peshawar.

MATERIAL AND METHODS

A total of 532 diabetics who had further developed complications were selected in medical and surgical wards of Khyber teaching hospital and cardiology department of Lady Reading Hospital, Peshawar from January 2004 to February 2005.

A detailed history of diabetes was taken. Duration of diabetes was also recorded. Family history of diabetes was also recorded.

Cases were labeled as Type 1 diabetics who had diabetes of juvenile onset or were not responding to higher doses of oral hypoglycemic. Similarly cases were labeled as Type 2 diabetics who had mature onset of the disease and were responding well to oral hypoglycemic. Diabetes was defined as fasting blood sugar more than 126mg/dl on more than one occasion.⁸

Inclusion criteria were all patients meeting the criteria for diabetes as defined irrespective of age and sex, admitted in two tertiary hospitals of Peshawar (Khyber teaching hospital and Lady Reading Hospital). Exclusion criteria were patients with diabetes with no associated complications.

After collecting data statistical analysis was done on the questionnaire and association of different complications with diabetes was studied.

DISTRIBUTION OF DIABETES ON BASES OF SEX GROUPS:

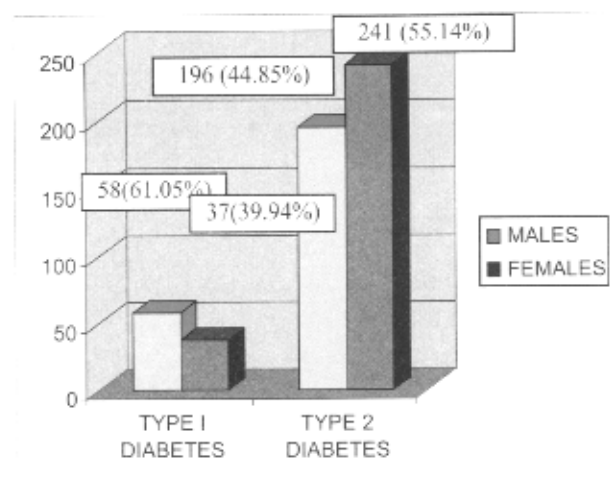


FIGURE-II

RESULTS

Out of 532 patients, 437 (82.14%) were Type-2 diabetics and 95 (17.85%) were Type-1 diabetics (Fig-1).

Gender wise distribution of patients: Out of 437 Type-2 patients, 241 (55.14%) were females and 196 (44.85%) were males, while out of 95 types-1 patients, 58(61.05%) were males and 37(39.94%) females (Fig.2).

Age range: The age range in Type-1 diabetes was from 31 to 82 years with an average of 56.5 years. Similarly the age range for Type-1 diabetes was from 19 years to 65 years with an average of 42 years.

Duration of the disease: Duration of both sets of diabetes varied from newly diagnosed cases up to 25 years of the disease. Two sixty-seven (63.15%) of Type-2 and 54 (56.84%) of Type-1 diabetes had more than 10 years duration of the disease.

Complications of both sets of diabetes: Various complications associated with Type-2 diabetes are shown in Table-I. The common complications in type-2 diabetics were coronary artery disease (CAD) in 268 (49.81%) cases, cerebrovascular accidents (CVA) in 61 (11.46%) cases and surgical ulcers in 59 (11.09%) cases. In type-1 diabetics, common complications were CAD in 38 (7.14%) cases, surgical ulcers in 16 (3%) cases, neuropathies in 15 (2.81%) cases and nephropathy in 9 (1.69%) cases. Over all cardiovascular diseases were present in 306 (57.5%) patients of DM, surgical ulcers in 75(14.1%) cases of DM and CVA in 67 (12.6%) cases of DM.

Coexistence of diabetes with other risk factors of stroke and coronary artery diseases: Coexistence of diabetes with other risk factors of stroke and coronary artery diseases are shown in

COMPLICATIONS OF BOTH SETS OF DIABETES MELLITUS (n = 532)

| Various complications associated with diabetes | Type 2 diabetes= 437 (82.14%) | Type 1 diabetes=95 (17.85%) | Total diabetics n=532 |
|--|-------------------------------|-----------------------------|-----------------------|
| Cardiovascular complications | 268(49.81%) | 38(7.14%) | 306 (57.5%) |
| Surgical Ulcers | 59(11.09%) | 16(3.00) | 75(14.1%) |
| Cerebrovascular accidents | 61(11.46%) | 6(1.12%) | 67 (12.6%) |
| Neuropathies | 12(2.25%) | 15(2.81%) | 27(5.1%) |
| Nephropathies | 12(2.25%) | 9(1.69%) | 21(3.9%) |
| Retinopathies | 17(3.19%) | 2(0.37%) | 19(3.6%) |
| Hypoglycemia | 6(1.12%) | 7(1.31%) | 13(2.4%) |
| Skin complications | 2(0.37%) | 0 | 2(0.4%) |
| Ketoacidosis | 0 | 2(0.37%) | 2(0.4%) |

Table 1

Table-II. Type-2 diabetes coexists with hypertension in 112 (36.60%) cases of CAD and 31 (46.26%) cases of CVA cases.

DISCUSSION

Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion (Type-1), insulin resistance (Type-2) or both. The chronic hyperglycemia in diabetes leads to long term complications of various organs especially heart, nerves, eyes, kidneys and blood vessels.⁹ In present study Type-2 was more common in our patients (82.14%) than Type-1 (17.85%). Morbidity of Type-2 diabetes is also far greater than Type-1. We found that cardiovascular diseases are major complications of uncontrolled diabetes affecting 306 (57.51%) of the whole sampling. It has been observed that cardiovascular diseases are more common,

- In people age more than 35 years,
- In Type-2 diabetes of more than 10 years duration,

- In Type-1 diabetes of more than 15 years duration,
- In presence of autonomic neuropathy, retinopathy, nephropathy and coronary heart diseases.¹⁰

In past, diabetes was considered as a risk factor to cardiac diseases, but now it is considered as a cardiac disease equivalent. A recent survey has attributed 75% of morbidity associated with diabetes to cardiovascular diseases¹¹. In our study the presentation of coronary artery diseases is far greater than other types of heart diseases. Haffner and his colleagues found that patients with Type-2 diabetes who have not had myocardial infarction (MI) have a risk of MI similar to that among non-diabetics patients who have had a risk of previous MI.¹²

Stroke is also more common in Type-2 diabetics than Type-1; present study shows that stroke cases with Type-2 diabetes were 61 and with Type-1 only 6 cases were recorded. In a study⁸ in tertiary care hospital of Peshawar showed

COEXISTENCE OF DIABETES WITH OTHER RISK FACTORS OF CORONARY ARTERY DISEASE AND CEREBROVASCULAR DISEASES

| Coexistence of diabetes with other risk factors | Coronary artery diseases = 306 | | Cerebrovascular diseases = 67 | |
|---|--------------------------------|---------------------|-------------------------------|--------------------|
| | Type 1 diabetes=38 | Type 2 diabetes=268 | Type 1 diabetes=6 | Type 2 diabetes=61 |
| Diabetes only | 17(5.55%) | 81(26.47%) | 0(0.00%) | 6(8.95%) |
| Diabetes + Hypertension | 8(2.61%) | 112(36.60%) | 4(5.97%) | 31(46.26%) |
| Diabetes +Smoking | 4(1.30 %) | 38(12.41%) | 1(1.49%) | 8(11.90%) |
| Diabetes +Hyperlipidemia | 7(2.28%) | 8(2.61%) | 1(1.49%) | 11(16.41%) |
| Diabetes +Obesity | 2(0.65%) | 23(7.51%) | 0(0.00%) | 4(5.97%) |
| Diabetes + Hypertension +Hyperlipidemia | 0(0.00%) | 6(1.96%) | 0(0.00%) | 1(1.49%) |

Table 2

DM contributing 28% of the total stroke cases. All of them were type 2 diabetics and were taking oral hypoglycemic. Eighteen percent of these patients had the disease coexisting with hypertension.⁸

In Pakistan 5-7% of adult population is having diabetes, while 45% of these diabetics have foot ulcers.¹¹ In present study 59 case of diabetic ulcer (56 were diabetic foot and 3 cases of diabetic hand) were recoded in Type-2 diabetes and 16 cases (15 were diabetic foot and one case of diabetic hand) with Type-1 diabetes, were recorded. In A study from Baqui university department of diabetology Karachi, also gave the same results¹⁴. In this study, 99 patients were type II diabetics and 69% patients were in the age group between 40-60 years.. Fifty percent patients were on oral hypoglycaemic agents, 48% were insulin treated, while 2% were on diet and exercise alone. Glycaemic control was poor in 70%, fair in 16% and was good in 14%. Duration of diabetes was greater than ten years in 58% and toes were affected in 44%. Eleven patients had ulcers on both feet. Neuropathic ulcer were 42% and neuro ischaemic in 58% cases. Fundal changes were present in 37%; proteinuria in 37%, ischaemic heart disease in 20%, hypertension 18%. In 60% cases, more than one antibiotic was used.¹⁴

Type-2 diabetes is one of the main causes of glomerulosclerosis and in our study out of 437 cases of type 2 DM, 12 (2.25%) cases had nephropathy. In 9 cases (1.69%) of type 1 DM also had nephropathy. However due to non-availability of the biopsy reports, details of the renal involvement in type 1 and type 2 DM could not be collected.

Another common complication of DM is hypoglycemia. Out of 13 cases of hypoglycemia, 7 had Type-1 DM. In Type-1 diabetes there is release of glucagon, which occurs early in natural history of Type-1 diabetes, while epinephrine response becomes impaired in large term duration of Type-1 diabetes, both of which contributes to induce hypoglycemia.¹²

In our study, Type-2 diabetes coexists with hypertension to produce 36.60% of coronary artery diseases and 46.26% of cerebrovascular diseases. It has been noted that the development of dyslipidemia and hypertension in diabetic individuals is due to insulin resistance.¹⁵ Obesity is often considered as a sign of prosperity and well being by misconceptions, but they do not know that obesity is a main risk factor to Type-2 diabetes. Hence public education to address such misconceptions and to promote healthy behaviors is essential and should be disseminated at both individual and community levels.¹⁷

CONCLUSION

Type-2 diabetes mellitus is a major modifiable risk factor for coronary artery disease, stroke, surgical amputations, neuropathies, retinopathies and end stage renal disease. The frequency and morbidity of Type 2 diabetes is more common than Type 1 diabetes in our selected patients. Type-2 diabetes is still posing a challenge for clinicians and diabetologists. Early detection and proper control of diabetes is the need of time to avoid its complications.

REFERENCES

1. Judith M, George AM. Ed. The Atlas of Heart diseases and Stroke. World health organization and CDC, 1st Ed. The Hanway press London 2004: 38-40.
2. Pambianco G, Costacou T, Ellis D, Becker DJ, Klein R, Orchard TJ. The 30-year natural history of type 1 diabetes complications: The Pittsburgh epidemiologies of diabetes complications study experience. *Diabetes* 2006; 55:1463-9.
3. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes. Estimate for the year 2000 and projections of 2030. *Diabetes Care* 2004;27:1047-53.
4. Dwarakanathan A. Diabetes update. *J Insur Med* 2006; 38:20-30.
5. Kim JA, Montagnani M, Koh KK, Quon MJ. Reciprocal relationships between insulin resistance and endothelial dysfunction: molecular and pathophysiological mechanisms. *Circulation* 2006 18;113:1888-904.
6. Rehman FU, Nadir S, Noor S. Diabetic Foot. *J Postgrad Med Inst* 2004;18: 463-9.
7. Valiquette L. Urinary tract infection in women. *Con J Urol*, 2001; 8: 6-12.
8. Alam I, Haider I, Wahab F, Khan W, Taqeeem MA, Nowsherwan. Risk factors stratification in 100 patients of acute stroke. *J Postgrad Med Inst* 2004; 18:583-91.
9. Schuster DP, Duvuui V. Diabetes mellitus. *Clin Pediatr Med Surg* 2002;19:79-107.
10. American Diabetes Association. Diabetes and exercise: The risk benefit profile. In: Devlin JT, Ruderman N, Alexendra VA (Eds). *Guide to diabetes and exercise*. American Diabetes Association, 1995:3-4.
11. Georgia S Willie, MD. The news on NCEPIV. *Clinical diabetes*, 2001; 19 (4): 170-1.
12. Haffner SM, Lehto S, Ronnema T, Pyrola K, Laakso M. Mortality from coronary heart

- disease in subjects with type-2 diabetes mellitus and in non-diabetic subjects with and without prior myocardial infraction. *N Engl J Med* 1998;339: 229-34.
13. Rashid T, Haroon TS. Cutaneous manifestation of diabetes mellitus. A study from Lahore, Pakistan. *Specialist: Pak J Med Sci* 1997; 13:217-20.
 14. Ali SM, Basit A, Sheikh T, Mumtaz S, Hydrie MZ. Diabetic foot ulcer: A prospective study. *J Pak Med Assoc.* 2001; 51:78-81.
 15. Saleh M, Grunberger G. Hypoglycemia: An excuse for poor Glycemic control? *Clin diabetes* 2001; 19:161-7.
 16. Odawara M. Evidence based on treatment of dyslipidemia associated with diabetes mellitus. *Nippon Rinsho* 2002;60:1010-6.
 17. Bhopal R. Epidemic of cardiovascular diseases in South Asians. Prevention must start in childhood. *Br Med J* 2002;324:625-6.

Address for Correspondence:

Mr Hamzullah Khan
 Final year MBBS Student
 Khyber Medical College,
 Peshawar, Pakistan.
 Phone number: 0092-321-9020843
 Email: hamza_kmc@yahoo.com