

# Assessment of Long- Term Complications of Type II Diabetes Mellitus

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## Abstract

**Background:** The aim is to assess long term complications of type II diabetes mellitus. **Subjects and Methods :** One hundred twenty- six adult subjects in age range 20-60 years of either gender diagnosed with type II diabetes mellitus were selected. 5 ml of venous blood was obtained and all were subjected to fasting blood glucose, random blood glucose and glycated hemoglobin assessment. History of diet, smoking, alcoholism was obtained. Complications occurring in subjects was recorded in case history proforma. **Results:** Out of 126 subjects, males were 76 (60.3%) and females were 50 (39.6%). Common risk factors recorded were obesity seen in 68, alcohol in 53 and smoking in 48. The difference was non-significant ( $P > 0.05$ ). Common long- term complications were retinopathy seen in 72, neuropathy in 30, nephropathy in 48, hypertension in 97, diabetic foot in 56 and impotency in 32 patients. The difference was significant ( $P < 0.05$ ). **Conclusion:** Common long- term complications were retinopathy, neuropathy, nephropathy, hypertension, diabetic foot and impotency.

**Keywords:** Diabetic foot, retinopathy, neuropathy, hypertension.

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## Introduction

Diabetes mellitus is a metabolic disorder characterized by increase blood glucose level. Hyperglycemia can generate functional and structural damages which might yield macrovascular and/or microvascular complications during this more or less long period of undetected disease.<sup>[1]</sup> In fact, a number of studies reported that a significant proportion of subjects with newly diagnosed T2DM already have chronic complications. Nowadays, at least in Western countries, T2DM is probably diagnosed at an earlier stage and this might have reduced the prevalence of complications at time of diagnosis.<sup>[2]</sup>

Type 2 diabetes mellitus is one of the major chronic disease burdens with a prevalence of 422 million patients worldwide. In addition, type 2 diabetes is a leading cause of severe morbidities and disabilities (blindness, chronic renal impairment, cardiovascular events, and lower limb amputation).<sup>[3]</sup> The chronic complications of diabetes are broadly divided into microvascular and macrovascular, with the former having much higher prevalence than the latter.<sup>[4]</sup> Microvascular complications include neuropathy, nephropathy, and retinopathy, while macrovascular complications consist of cardiovascular disease, stroke, and peripheral artery disease (PAD). Dia-

betic foot syndrome has been defined as the presence of foot ulcer associated with neuropathy, PAD, and infection, and it is a major cause of lower limb amputation.<sup>[5,6]</sup> Considering this, we selected present study to long term complications of type II diabetes mellitus.

## Subjects and Methods

A sum total of one hundred twenty- six adult subjects in age range 20-60 years of either gender diagnosed with type II diabetes mellitus were selected. This prospective, observational study got approved from ethical review and ethical clearance committee. All enrolled subjects were made aware of the study and their written consent was obtained.

Demographic data of each subject such as name, age, gender etc. was recorded. 5 ml of venous blood was obtained and all were subjected to fasting blood glucose, random blood glucose and glycated hemoglobin assessment. History of diet, smoking, alcoholism was obtained. Complications occurring in subjects were recorded in case history proforma. We compiled all results were entered in MS excel sheet. They were statistically studied using SPSS version 19.0 and chi- square test where p value less than 0.05 was considered significant.

Results

Table 1: Distribution of subjects

Total- 126		
Gender	Male	Female
Number (%)	76 (60.3%)	50 (39.6%)

Out of 126 subjects, males were 76 (60.3%) and females were 50 (39.6%) [Table 1].

Table 2: Evaluation of risk factors

Risk factors	Number	P value
Obesity	68	>0.05
Alcohol	53	
smoking	48	

Common risk factors recorded were obesity seen in 68, alcohol in 53 and smoking in 48. The difference was non- significant (P> 0.05) [Table 2, Figure 1].

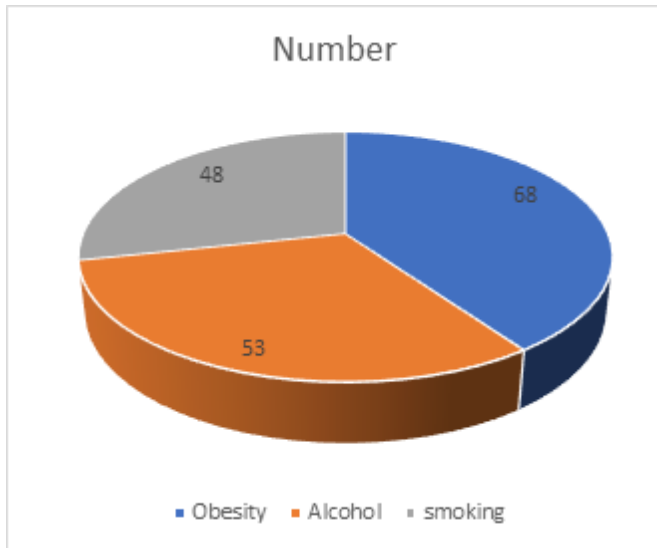


Figure 1: Evaluation of risk factors

Common long- term complications were retinopathy seen in 72, neuropathy in 30, nephropathy in 48, hypertension in 97, diabetic foot in 56 and impotency in 32 patients. The difference was significant (P< 0.05) [Table 3, Figure 2].

Discussion

Diabetes is fast gaining the status of a potential epidemic in India. Among the various microvascular and macrovascular

Table 3: Assessment of long- term complications

Complications	Number	P value
Retinopathy	72	<0.05
Neuropathy	30	
Nephropathy	48	
Hypertension	97	
Diabetic foot	56	
impotency	32	

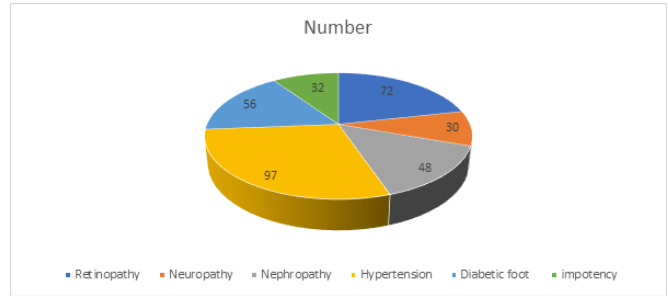


Figure 2: Assessment of long- term complications

complications of diabetes, neuropathy is a major health problem responsible for substantial morbidity, increased mortality and impaired quality of life.<sup>[7,8]</sup> Several pathogenic processes are involved in the development of diabetes.<sup>[9,10]</sup> These range from autoimmune destruction of the  $\beta$ -cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action.<sup>[11]</sup> The basis of the abnormalities in carbohydrate, fat, and protein metabolism in diabetes is deficient action of insulin on target tissues.<sup>[12,13]</sup> We selected present study to long term complications of type II diabetes mellitus.

Our results showed that out of 126 subjects, males were 76 (60.3%) and females were 50 (39.6%). Bonora et al,<sup>[14]</sup> examined 806 patients and clinical cardiovascular disease (CVD) was revealed in 11.2% and preclinical CVD in 7.7%. Somatic neuropathy was found in 21.2% and cardiovascular autonomic neuropathy in 18.6%. Retinopathy was observed in 4.9% (background 4.2%, proliferative 0.7%). Chronic kidney disease (estimated glomerular filtration rate <60mL/min/1.73 m2) was found in 8.8% and excessive albuminuria in 13.2% (microalbuminuria 11.9%, macroalbuminuria 1.3%). Isolated microvascular disease occurred in 30.8%, isolated macrovascular disease in 9.3%, a combination of both in 9.1%, any complication in 49.2% and no complications in 50.8%. Gender, age, body mass index, smoking, hemoglobin A1c and/or hypertension were independently associated with one or more complications. Insulin resistance and beta-cell dysfunction were associated with macrovascular but not

microvascular disease.

Our results showed that common risk factors recorded were obesity seen in 68, alcohol in 53 and smoking in 48. Jelinek et al,<sup>[15]</sup> found common complications such as hypertension (83.40%), obesity (90.49%) and dyslipidemia (93.43%) were common type 2 diabetes comorbidities. Most of the patients had relatively poor glycemic control and presented with multiple complications (83.47% of patients had one or more complication), with frequent renal involvement. The most frequent complication was retinopathy (13.26%). However, the pattern of complications varied based on age, where in patients 65 years old with Low estimated glomerular filtration rate in combination with disease duration was the most significant risk factor in the development of a diabetic-associated complication especially for coronary artery disease, whereas age, lipid values and waist circumference were significantly associated with the development of diabetic retinopathy.

Our results showed that common long- term complications were retinopathy seen in 72, neuropathy in 30, nephropathy in 48, hypertension in 97, diabetic foot in 56 and impotency in 32 patients. Katulanda P et al,<sup>[16]</sup> determined the prevalence, patterns and predictors of diabetic peripheral neuropathy in a developing country. The mean age of those with and without DPN was  $62.1 \pm 10.8$  and  $55.1 \pm 10.8$  years respectively. The majority of those with DPN were from rural-areas (75.3%). In the binary logistic-regression presence of foot ulcers, female gender and smoking were the strongest predictors followed by insulin treatment, diabetic retinopathy, treatment with sulphonylureas, increasing weight, rural residence, higher levels of triglycerides and longer duration of DM.

Sriwijitkamol et al,<sup>[17]</sup> in their study of 722 diabetes patients who were recruited, 7.5% were treated by general practitioners (GP), 10.4% by internal medicine residents, (RES) 49.9% by internist (Int), 11.8% by endocrinologist (Endo) and 20.5% were indeterminate because they could not identify the field of the health care provider. 38.4% of patients received an eye examination by an ophthalmologist. 42% were screened for diabetic nephropathy. Serum creatinine level was measured in 83.5%. Foot examination was done in only 125 patients (17.3%). We founded that patients taken care by GP and Int received less intensive and less extensive assessment for diabetic complications than those taken care by Res and Endo. The prevalences of diabetic nephropathy and chronic kidney disease of at least stage 3 were 37 and 48.2%, respectively. Diabetic retinopathy occurred in 31.2%, cardiovascular disease in 28.9%, cerebrovascular disease in 10.6% and diabetic foot in 40%.

## Conclusion

Common long- term complications were retinopathy, neuropathy, nephropathy, hypertension, diabetic foot and impotency.

## References

1. Kostev K, Jockwig A, Hallwachs A. Prevalence and risk factors of neuropathy in newly diagnosed type 2 diabetes in primary care practices: a retrospective database analysis in Germany. *Prim Care Diabetes*. 2014;8(3):250–255. Available from: <https://doi.org/10.1016/j.pcd.2014.01.011>.
2. Piniés JA, González-Carril F, Arteagoitia JM. Development of a prediction model for fatal and non-fatal coronary heart disease and cardiovascular disease in patients with newly diagnosed type 2 diabetes mellitus: the Basque country prospective complications and mortality study risk engine (BASCORE). *Diabetologia*. 2014;57(11):2324–2333. Available from: <https://doi.org/10.1007/s00125-014-3370-1>.
3. Sandbæk A, Griffin SJ, Sharp SJ, Simmons RK, Borch-Johnsen K, Rutten GEHM, et al. Effect of early multifactorial therapy compared with routine care on microvascular outcomes at 5 years in people with screen-detected diabetes: a randomized controlled trial: the ADDITION-Europe study. *Diabetes Care*. 2014;37(7):2015–2023. Available from: <https://doi.org/10.2337/dc13-1544>.
4. Martinell M, Dorkhan M, Stålhammar J, Storm P, Groop L, Gustavsson C. Prevalence and risk factors for diabetic retinopathy at diagnosis (DRAD) in patients recently diagnosed with type 2 diabetes (T2D) or latent autoimmune diabetes in the adult (LADA). *J Diabetes Complications*. 2016;30(8):1456–1461. Available from: <https://doi.org/10.1016/j.jdiacomp.2016.08.009>.
5. Boulton J, Kempler P, Ametov A, Ziegler D. Whether pathogenetic treatments for diabetic polyneuropathy? *Diabetes Metab Res Rev*. 2013;29(5):327–333. Available from: <https://doi.org/10.1002/dmrr.2397>.
6. Vincent AM, Callaghan BC, Smith AL, Feldman EL. Diabetic neuropathy: cellular mechanisms as therapeutic targets. *Nat Rev Neurol*. 2011;7(10):573–583. Available from: <https://doi.org/10.1038/nrneuro.2011.137>.
7. Guariguata L. By the numbers: new estimates from the IDF Diabetes Atlas Update for 2012. *Diabetes Res Clin Pract*. 2012;98(3):524–525. Available from: <https://doi.org/10.1016/j.diabres.2012.11.006>.
8. Chawla A, Chawla R, Jaggi S. Microvascular and macrovascular complications in diabetes mellitus: Distinct or continuum? *Indian J Endocrinol Metab*. 2016;20(4):546–551. Available from: <https://dx.doi.org/10.4103/2230-8210.183480>.
9. Mohan V, Pradeepa R. Epidemiology of diabetes in different regions of India. *Health Administrator*. 2009;22:1–18.
10. Rani PK, Raman R, Rachapalli SR, Pal SS, Kulothungan V, Sharma T. Prevalence and risk factors for severity of diabetic neuropathy in type 2 diabetes mellitus. *Indian J Med Sci*. 2010;64(2):51–57.
11. Oguejiofor OC, Odenigbo CU, Oguejiofor CB. Evaluation of the effect of duration of diabetes mellitus on peripheral neuropathy using the United Kingdom screening test scoring system, bio-thesiometry and aesthesiometry. *Niger J Clin Pract*. 2010;13(3):240–247.

12. Escobar C, Blanes I, Ruiz A, Vinuesa D, Montero M, Rodríguez M. Prevalence and clinical profile and management of peripheral arterial disease in elderly patients with diabetes. *Eur J Intern Med.* 2011;22(3):275–281. Available from: <https://doi.org/10.1016/j.ejim.2011.02.001>.
13. Banoo S, Shubha DS, Shashidhar V, Venkatesha D. Bacterial and clinical profile of diabetic foot patients. *Ann Trop Med Public Health.* 2012;5(2):69–73. Available from: <http://dx.doi.org/10.4103/1755-6783.95952>.
14. Bonora E, Trombetta M, Dauriz M, Travia D, Cacciatori V, Brangani C, et al. Chronic complications in patients with newly diagnosed type 2 diabetes: prevalence and related metabolic and clinical features: the Verona Newly Diagnosed Type 2 Diabetes Study (VNDS) 9. *BMJ Open Diab Res Care.* 2020;8(1):1549. Available from: <https://doi.org/10.1136/bmjdr-2020-001549>.
15. Jelinek HF, Osman WM, Khandoker AH, Khalaf K, Lee S, Almahmeed W, et al. Clinical profiles, comorbidities and complications of type 2 diabetes mellitus in patients from United Arab Emirates. *BMJ Open Diabetes Res Care.* 2017;5(1):427. Available from: <https://doi.org/10.1136/bmjdr-2017-000427>.
16. Katulanda P, Ranasinghe P, Jayawardena R, Constantine GR, Sheriff M, Matthews DR. The prevalence, patterns and predictors of diabetic peripheral neuropathy in a developing country. *Diabetol Metab Syndr.* 2012;4(1):21. Available from: <https://doi.org/10.1186/1758-5996-4-21>.
17. Sriwijitkamol A, Mounngern Y, Vannaseang S. Assessment and prevalences of diabetic complications in 722 Thai type 2 diabetes patients. *J Med Assoc Thai.* 2011;94(2):168–174.

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