

Original Research Article

## Study of Complication Profile in Type 2 Diabetes Mellitus Patients at First Visit to Tertiary Care Clinic in Central Indian Context

Abha Pandit

Assistant Professor, Department of Medicine, Index Medical College Hospital and Research Centre, Indore (MP), India.

Received: 20/04/2016

Revised: 11/05/2016

Accepted: 13/05/2016

### ABSTRACT

127 patients reporting first time for care at medical outdoor of Index medical college Indore and diagnosed as type 2 diabetes were studied for existing micro vascular and macro vascular complications. History of first knowledge of their diabetes to the patients was elicited to define disease duration. Patients were categorized by disease duration and with clinical and laboratory examination micro vascular complications retinopathy, nephropathy and peripheral neuropathy were evaluated. Macro vascular complications as hypertension, ischaemic heart disease and peripheral vascular disease were also clinically assessed. The findings revealed presence of at least one micro vascular complication in every patient. Hypertension was marked association. The implications of findings to our understanding of type 2 diabetes in the zone, and right approach to management is discussed including literature review and research.

**Keywords:** Type 2 Diabetes; Retinopathy; Nephropathy; Peripheral neuropathy; Microangiopathy.

### INTRODUCTION

Type 2 Diabetes is often not diagnosed until patient has had disease for many years. <sup>[1]</sup> Long term complications of the disease are thus present by time of diagnosis. Epidemiologic study has shown a fifth of all diabetes patients' bear 2 or more micro vascular complications. <sup>[2]</sup> The complications give rise to morbidity and compromise of quality of life. <sup>[3,4]</sup> Undetected and untreated micro vascular complications in diabetes e.g., retinopathy, nephropathy and/or neuropathy result in compromise of quality of life and life expectancy as well as rise in health care burden and costs. As the incidence of Diabetes continues to rise, burden of diabetic micro vascular complications will increase in future. Research must continue to define factors associated with onset and propagation of such complications to strategize reduction of consequent morbidity

and mortality. Prevalence of such complications at time of first clinical reporting by type 2 Diabetes patients was examined and profile of glycaemic control and disease duration were studied to draw a local evidence base, at the medicine outdoors of Index Medical College Indore, Central India during period of October 2007 to Dec 2009.

### Patients and Method

It was purely observational study appended to routine management. 127 patients of Diabetes mellitus diagnosis and screened positive for presence of micro vascular complications were included in study subject to their informed written consent.

Any grades of retinopathy under dilated funduscopy, <sup>[5]</sup> were included in the study. Diabetic nephropathy was diagnosed by albuminuria greater than 20mg/dl, <sup>[6]</sup> in morning urine sample with blood glucose

below 200mg/dl and no abnormality in urine examination. Creatinine clearance in the patients was calculated using Cockcroft Gault formula. [7] Further by estimated GFR cases in chronic kidney disease category (CKD) were also identified. [8]

Diabetic neuropathy was diagnosed by impairment or loss of sensory modalities of touch, vibration and pain in one or both feet. Touch was tested with cotton wool, pressure with 10g monofilament and vibration with 128Hz tuning fork.

Any past diagnosed ischaemic heart disease information was noted. Peripheral vascular disease was diagnosed from ankle/brachial blood pressure index as below 0.8 and weak or absent pedal pulse.

Patients were categorized by recorded duration since first diagnosis of Type 2 Diabetes as below 1 year; 1 to 5 years; 5 to 10 years; and beyond 10 years.

## RESULTS

Mean disease duration in the overall patients was  $8.1 \pm 6.2$  years.

**Table 1: shows prevalence of microvascular complication in different disease duration categories of patients**

Micro vascular complications	Under 1 year (n=13)	1-5 year (n=41)	5-10 years (n=32)	Above 10 years (n=31)
Retinopathy	1 (8%)	5 (12%)	9 (28%)	13 (42%)
Nephropathy	2 (15%)	8 (19.5%)	7 (21.5%)	9 (29.5%)
Neuropathy	1 (8%)	7 (17%)	9 (28%)	15 (48%)

**Table 2: Prevalence of macro vascular complications by disease duration categorization were as under**

Micro vascular complications	Under 1 year (n=13)	1-5 year (n=41)	5-10 years (n=32)	Above 10 years (n=31)
Peripheral Vascular Disease				2 (6.5%)
Ischemic Heart Disease	1 (7%)	2 (5%)	7 (21.5%)	13 (41.5%)
Hypertension	2 (15.5%)	12 (29%)	25 (78%)	28 (90%)

As per estimated GFR calculation using Cockcroft Gault formula the nephropathy cases were ascribed to stages of CKD. Under 1 year disease duration category had 2 cases in CKD stage 2 out of 13 patients (15%). Next every group had both 2<sup>nd</sup> and third stage CKD cases and not other stages. Thus 1-5 year group had 6 (15%) in stage 2 and 2 (5%) in stage 3. The 5-10 year group had 4 (12.5%) in stage 2 and 3 (9%) in stage 3. The beyond 10 year group had 5 (16%) in stage 2 and 4 (12.5%) in stage 3 CKD.

## DISCUSSION

While the determinants of macro vascular complications are ill-defined, there is much evidence implicating disease duration and severity as causal. Age also has significant influence. Individual variability is important as 10% of diabetics with lowest HbA1c profiles did suffer while 43% of those with highest HbA1c profile were free from micro vascular complications, in an epidemiologic investigation. [9] Hyperglycaemia indicating disease severity

activates polyol pathway; synthesis of AGE (advanced glycosylation end products) and drives protein kinase driven pathways under common agency of oxygen free radical species. [10,11] Hypertension is commonly found in newly diagnosed type 2 diabetes cases, especially obese. [12] Direct bearing of systolic hypertension to risk of diabetic complications is shown, [13] while tight control of blood pressure reduces the risk. [14,15] Hypertension in diabetes is associated with higher severity of albuminuria. [12] Annual death rate of diabetes patients increases with increasing severity of albuminuria. [16]

In the present study, even cases with less than one year duration of diabetes diagnosis, did exhibit incidences of each kind of micro vascular complication. Cases with up to 5 year duration had 1 in 5 patients with nephropathy of stage 2 chronic kidney disease. Studies have repeatedly shown worth of tight control of blood sugar, blood pressure and lipids in delaying onset and slowing down progression of micro vascular complications in diabetics. [17]

Deleterious effects of hyperglycaemia and micro - albuminuria persist long after blood sugar control. [18] The benefit of early intensive control therapy and adverse effects of inadequate control also persist. [19,20] It is believed that long before occurrence of hyperglycaemia, events occur that scar the cells fostering development of micro and macrovascular complications. [20] Intense blood sugar and blood pressure control reduces risk of diabetic complications [14,21,22] and their cost burden. [23] Intensive treatment of diabetes has quantitative preventive impact on retinopathy and both delays and reverses neuropathy. [24,25]

Chronic Diabetic complications have prognostic significance and also are indicative of the quality of blood sugar control. Type 2 Diabetes mellitus poses huge challenge for health care system by sheer magnitude. The therapeutic implications of study findings are that early detection and address of micro vascular complications deserves to be crucial practice even at very first encounter with the diabetes patients. There is ongoing attempt to develop assessment protocol for micro vascular dysfunction. New therapies to prevent adverse effect of hyperglycaemia, including aldose reductase inhibitors, AGE inhibitors and protein kinase C inhibitors are in process of development. [26]

## REFERENCES

1. National Service Foundation for Diabetes: Standards. London UK Department of Health 2001.
2. Morgan CL, Currie CJ, Stott NC, Smithers M, Butler CC, Peters JR. The Prevalence of Multiple Diabetes-Related Complications. *Diabet Med.* 2000, 17:146-151.
3. Brown GC, Brown MM, Sharma S, Brown H, Gozum M, Denton P. Quality Of Life Associated With Diabetes Mellitus In An Adult Population. *J Diabetes Complications.* 2000, 14:18-24.
4. Quality Of Life In Type 2 Diabetic Patients Is Affected By Complications But Not By Intensive Policies To Improve Blood Glucose Or Blood Pressure Control (UKPDS 37). U.K. Prospective Diabetes Study Group. *Diabetes Care.* 1999, 22:1125-1136.
5. Harding S. Extracts From "Concise Clinical Evidence". *Diabetic Retinopathy.* *BMJ.* 2003, 326:1023-1025.
6. Gross JL, De Azevedo MJ, Silveiro SP, Canani LH, Caramori ML, Zelmanovitz T. Diabetic Nephropathy: Diagnosis, Prevention, and Treatment. *Diabetes Care.* 2005, 28:164-176.
7. Botev R, Mallié JP, Couchoud C, Schück O, Fauvel JP, Wetzels JF, Lee N, De Santo NG, Cirillo M. Estimating Glomerular Filtration Rate: Cockcroft-Gault And Modification Of Diet In Renal Disease Formulas Compared To Renal Inulin Clearance. *Clin J Am Soc Nephrol.* 2009, 4:899-906.
8. White C, Akbari A, Hussain N, Dinh L, Filler G, Lepage N, Knoll GA. Chronic Kidney Disease Stage in Renal Transplantation Classification Using Cystatin C And Creatinine-Based Equations. *Nephrol Dial Transplant.* 2007, 22:3013-3020.
9. Zhang L, Krzentowski G, Albert A, Lefebvre PJ. Risk Of Developing Retinopathy In Diabetes Control And Complications Trial Type 1 Diabetic Patients With Good Or Poor Metabolic Control. *Diabetes Care.* 2001, 24:1275-1279.
10. Sima AA. New Insights into the Metabolic and Molecular Basis for Diabetic Neuropathy. *Cell Mol Life Sci.* 2003, 60:2445-2464.
11. Vincent AM, Feldman EL. New Insights into the Mechanisms of Diabetic Neuropathy. *Rev Endocr Metab Disord.* 2004, 5:227-236.
12. Hypertension in Diabetes Study (HDS): I. Prevalence of Hypertension in Newly Presenting Type 2 Diabetic Patients and the Association with Risk Factors for Cardiovascular And Diabetic Complications. *J Hypertens.* 1993, 11:309-317.
13. Adler AI, Stratton IM, Neil HA, Yudkin JS, Matthews DR, Cull CA, Wright AD, Turner RC, Holman RR. Association of Systolic Blood Pressure with Macrovascular and Microvascular

- Complications of Type 2 Diabetes (UKPDS 36): Prospective Observational Study. *BMJ*. 2000, 321:412-419.
14. Tight Blood Pressure Control and Risk of Macrovascular and Microvascular Complications in Type 2 Diabetes: UKPDS 38. UK Prospective Diabetes Study Group. *BMJ*. 1998, 317:703-713.
  15. Effect of Intensive Diabetes Treatment on Nerve Conduction in the Diabetes Control and Complications Trial. *Ann Neurol*. 1995, 38:869-880.
  16. Adler AI, Stevens RJ, Manley SE, Bilous RW, Cull CA, Holman RR; UKPDS GROUP. Development and Progression of Nephropathy In Type 2 Diabetes: The United Kingdom Prospective Diabetes Study (UKPDS 64). *Kidney Int*. 2003, 63:225-232.
  17. Laker RD. The Diabetes Control And Complications Trial. Implications for Policy and Practice. *N Engl J Med*. 1993, 329:1035-1036.
  18. Writing Team for the Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions And Complications Research Group. Effect of Intensive Therapy on the Microvascular Complications of Type 1 Diabetes Mellitus. *JAMA*. 2002, 287: 2563-2569.
  19. Genuth S, Sun W, Cleary P, Sell DR, Dahms W, Malone J, Sivitz W, Monnier VM; DCCT Skin Collagen Ancillary Study Group. Glycation And Carboxymethyllysine Levels In Skin Collagen Predict The Risk Of Future 10-Year Progression Of Diabetic Retinopathy And Nephropathy In The Diabetes Control And Complications Trial And Epidemiology Of diabetes Interventions And Complications Participants With Type 1 Diabetes. *Diabetes*. 2005, 54:3103-3111.
  20. Leroith D, Fonseca V, Vinik A. Metabolic Memory In Diabetes--Focus On Insulin. *Diabetes Metab Res Rev*. 2005, 21:85-90.
  21. The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long - Term Complications in Insulin-Dependent Diabetes Mellitus. The Diabetes Control and Complications Trial Research Group. *N Engl J Med*. 1993, 329:977-986.
  22. Intensive Blood-Glucose Control With Sulphonylureas Or Insulin Compared With Conventional Treatment And Risk Of Complications In Patients With Type 2 Diabetes (UKPDS 33). UK Prospective Diabetes Study (UKPDS) Group. *Lancet*. 1998, 352:837-853.
  23. Gray A, Clarke P, Farmer A, Holman R; United Kingdom Prospective Diabetes Study (UKPDS) Group. Implementing Intensive Control Of Blood Glucose Concentration And Blood Pressure In Type 2 Diabetes In England: Cost Analysis (UKPDS 63). *BMJ*. 2002, 325:860.
  24. Henricsson M, Nilsson A, Janzon L, Groop L. the Effect Of Glycaemic Control And The Introduction Of Insulin Therapy On Retinopathy In Non - Insulin - Dependent Diabetes Mellitus. *Diabet Med*. 1997, 14:123-131.
  25. Lifetime Benefits and Costs of Intensive Therapy As Practiced In the Diabetes Control and Complications Trial. The Diabetes Control and Complications Trial Research Group. *JAMA*. 1996, 276:1409-1415.
  26. Girach A, Manner D, Porta M. Diabetic Microvascular Complications: Can Patients At Risk Be Identified? A Review. *Int J Clin Pract*. 2006, 60:1471-1483.

How to cite this article: Pandit A. Study of complication profile in type 2 diabetes mellitus patients at first visit to tertiary care clinic in central Indian context. *Int J Health Sci Res*. 2016; 6(6):46-49.

\*\*\*\*\*