

Original Article

# Evaluation of Vascular Complications in Patients with Type 2 Diabetes Mellitus at a South Indian Tertiary Care Hospital

Silvy Grace B<sup>1,\*</sup>, Soma Sundaram I<sup>2</sup>

<sup>1</sup>PhD Scholar, VELS University, Pallavarum, Chennai, Tamil Nadu, India;

<sup>2</sup>Professor, VELS University, Pallavarum, Chennai, Tamil Nadu, India.

**ARTICLE INFO:**

Received: 29 Jan 2021

Accepted: 22 Feb 2021

Published: 28 Feb 2021

**Corresponding author \***

Silvy Grace B,  
PhD Scholar, VELS University,  
Pallavarum, Chennai, Tamil  
Nadu, India.  
E Mail: silvyagrace@gmail.com

**ABSTRACT:**

Background: Now a day, globally diabetes is one of the most common chronic non-communicable diseases globally. In our study to assess, the clinical characteristics and complications in patients with type 2 diabetes mellitus. The main aim of the present study was to evaluate the complications among diabetic patients in different age groups. Methodology: It's a Prospective-observational study, carried out in 9 months at patients attending a tertiary care hospital in Guntur. We enrolled age group between 30- 80 years patients. Results: Out of 215 patients, males were 122 and females were 93. Above 50% of patients were diagnosed within the age group of 51-65 years. About 61% of patients were having overweight based on BMI ranges and about 63% of patients were at high risk of HbA1C i.e., >6%. The mean age was found to be 51-65(50.97%). Out of all comorbidities, it was found that hypertension 112 (52.09%) was high. The complications associated with diabetes found in the present study were microvascular complications which include microvascular complications, nephropathy (n=63) was high followed by neuropathy (n=53); retinopathy (n=31), and males (n=108) were more prone than females (n=80). Drug therapy was monotherapy 106(49.30%) and dual therapy 29 (13.48%). Triple therapy 7 (3.25%) usage was less when compared to mono and dual therapy. Conclusion: Based on our study interpretation, the complications of DM are commonly seen in those are having uncontrolled glucose levels. Among microvascular complications, nephropathy was most commonly observed, followed by neuropathy also. Enhancing level of HbA1c and BMI was found to be a more significant correlation with neuropathy in most of the individuals.

**Keywords:** Diabetes mellitus, Coronary artery diseases, Macrovascular, microvascular, nephropathy.

## 1. INTRODUCTION

The ancient time Indian physicians, Sushruta and Charaka (400–500 A.D.) identified the two types, afterward named as Type I and Type II diabetes [1]. Diabetes is fast gaining the status of a potential epidemic in India. Currently, there are an estimated 72.96 million cases of diabetes in the adult population of India [2]. The prevalence in urban areas ranges between 10.9% and 14.2% and prevalence in rural India was 3.0-7.8% among population aged 20 years and above with a much higher prevalence among individuals aged over 50 years [3]. It is predicted that by the year 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while United States (30.3 million) will also see significant increases in those affected by the disease(4)Two-thirds of individuals with diabetes die of cardiovascular diseases and stroke. Many risk factors increase the chance of high mortality rates [3, 4].

The risk of the occurrence of devastating complications of target organs like the eyes, vessels, nerves, and kidneys ultimately influenced morbidity and mortality [5, 6] Evidence of classification of diabetic coma was reported in 1886 by Professor Julius Dreschfeld. The hypothesis that microvascular disease underlies some major complications of diabetes (retinopathy, neuropathy, and nephropathy) was put forward in 1941 [6, 7]. The diabetic vascular complication [8] is a leading cause of end-stage renal failure, acquired blindness, a variety of neuropathies, and accelerated atherosclerosis, which could account for disabilities and high mortality rates in patients with diabetes [9].

Diabetes damages blood vessels, causing them to narrow and therefore restricting blood flow. Because blood vessels throughout the body are affected, people may have many complications of diabetes. These complications are responsible for most of the morbidity, hospitalizations, and

even death. The chronic complications of diabetes mellitus occur as a result of several mechanisms, which result from the formation of advanced glycation end products, oxidative stress, and endothelial damage [10, 11] its leads to Micro and macrovascular complications; [12] such as retinopathy, neuropathy, nephropathy, foot disease, peripheral vascular disease, coronary artery disease, stroke, heart failure, etc. Data from the World Health Organization shows that men have twice as a higher risk of developing Coronary artery diseases (CAD) than women. Patients with diabetes also have an increased risk of cancers. They also have an increased risk of other disorders such as depression, cognitive decline, pancreatitis, etc. [13].

**2. METHODOLOGY**

**2.1. Study design, Study site, and Duration of study**

It is a prospective –observational study, carried out in the endocrinology department of public tertiary care hospitals in Guntur, for 9 months [14].

**2.2. Inclusion criteria**

1. All the patients are included between the age groups 30-80 years who are diagnosed with Diabetes mellitus.

2. In our study, we include both males and females who are diagnosed with the microvascular complications of diabetes mellitus

**2.3. Exclusion criteria**

Patients who are not interested in participating in the study were excluded

**2.4. Data analysis and procedure**

Data that is collected and should be entered in the excel sheet. Demographic details of patients should be entered. Based on the Prospective and cross-sectional study, we should consider the inclusion and exclusion criteria for collecting the data. By this, we should analyze the data to know that how many patients were affected with vascular complications of diabetes mellitus like diabetic retinopathy, diabetic nephropathy, and diabetic neuropathy based on age, gender, BMI, duration of DM, type of DM, HbA1c. By this, we can know that which complication is more prevalent [15, 16].

**3. RESULTS AND DISCUSSION**

The morbidity and health care burden may increase based upon high prevalence and complications in diabetic patients. This present study evaluated the prevalence of vascular complications among diabetic patients attending a tertiary care hospital in Guntur, Andhra Pradesh.

**3.1 Demographic details of study subject**

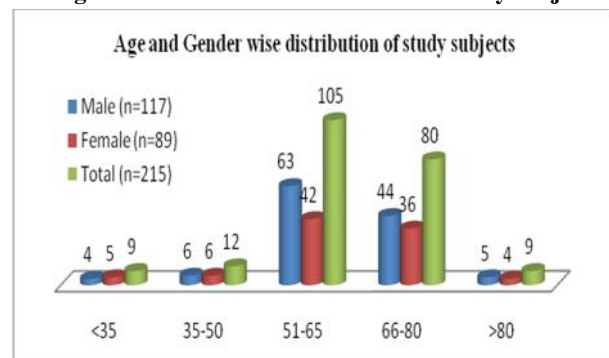
**Table 1: Demographic and clinical details of the study subject**

Characteristics of Study Sample	Frequency (n=215)
<b>Age (Years)</b>	
< 35	9(4.36%)
35-50	12(5.82%)
51-65	105(50.97%)
66-80	80(38.83%)

>80	9(4.18%)
<b>Gender</b>	
Male	122(56.74%)
Female	93(43.25%)
<b>Diseases Duration (Years)</b>	
0-5	51(23.72%)
6-10	84(39.06%)
>10	80(37.20%)
<b>BMI</b>	
Normal weight (<25)	28(13.02%)
Overweight (25-30)	130(60.46%)
Obese (>30)	57(26.51%)
<b>HbA1C</b>	
Normal (4-6%)	80(37.20%)
Higher risk (>6%)	135(62.79%)

In our study may exploit the patient demographic and clinical information of type 2 diabetic patients. Such as Age, Gender, Duration, BMI, HbA1C. Out of 215 patients, males were 122 and females were 93. Above 50% of patients were diagnosed within the age group of 51-65 years [17]. Almost 39% of patients were suffering from diabetes with duration of 5-10 years. About 61% of patients were having overweight based on BMI ranges and about 63% of patients were at high risk of HbA1C i.e., >6% [18,19]. The mean age was found to be 51-65(50.97%). Similar results are observed in previous studies. Similarly in our study explore the Gender distribution of subjects, the high impact on 51-65 age groups, because diabetes may progressive by the aggregation factors like age and gender, BMI, HbA1C, etc. [20]. The tabular presentation was mentioned in table 1.

**3.2. Age and Gender wise distribution of study subjects**



**Fig 1: Age and Gender wise distribution of diabetic patients**

This figure 1 shows age and gender-wise distribution in overall patients involved in the study. In our study males (n=116) were prominent over females (n=89). Out of 215 patients, over 48.83% were in the age group of 51-65 years followed by 37.20%, 4.18% & 4.18% were in the age group of >65, 35-50, >80 & <35 years respectively. In our study may contribute to the unmodifiable risk factor for the development of complications in diabetic patients [21].

**3.3. Description of comorbidities in patients involved in our study**

**Table 2: List of comorbidities**

S.NO	Co-morbidities	Frequency (%)
1	Hypertension	112(52.09%)
2	Hypertension +Hypothyroidism	34(15.81%)
3	Hypertension +Hypothyroidism and Asthma	10(4.65%)
4	Hypertension +Chronic Liver Disease	7(3.25%)
5	Hypertension+ Gastroenteritis	5(2.32%)
6	Hypertension +Urinary Tract Infection	3(1.39%)
7	None	44(20.46%)

In diseases, progression is mainly supported with multiple associated conditions that may be resulting in the development of risk of complications. This table 2 shows, list of comorbidities present in the patients involved in our study. Out of all comorbidities, it was found that hypertension 112(52.09%) followed by 34(15.81%), 10(4.65%), 7 (3.25%), 5(2.32%) & 3(1.39%) hypertension along with other comorbidities. Similar results were noticed in other potential studies [22, 23]

**3.4. Types of diabetic vascular complications**

**Table 3: Different types of diabetic vascular complications**

No of the study subjects	Microvascular complications	Macrovascular complications
Single	147(66.04%)	135(62.79%)
Combinational	41(19.06%)	50(23.25%)
Total	188(86.51%)	185(86.05%)

This table 3 shows both micro and macrovascular complications in overall patients. Some patients are having only a single complication either micro or macro and some are having combinational i.e., more than one complication, and some others having no complications. A single complication was mostly identified than the combinational type [24]. Out of all 215 patients, 188 micro and 185 macro complications were identified. Out of microvascular complications, 147 were single complications and 41 were combinational. Out of 185 macrovascular complications, 135 were single complications and 50 were combinational [25].

**3.5. Gender wise distribution of diabetic vascular complications**

**Table 4: Gender Wise Distribution of Diabetic Vascular Complications**

Gender wise distribution	Micro-vascular		Macro-vascular	
	With	Without	With	Without
Male	108(50.23%)	9(4.18%)	106(49.30%)	11(4.65%)
Female	80(37.20%)	9(4.18%)	79(36.74%)	10(4.65%)

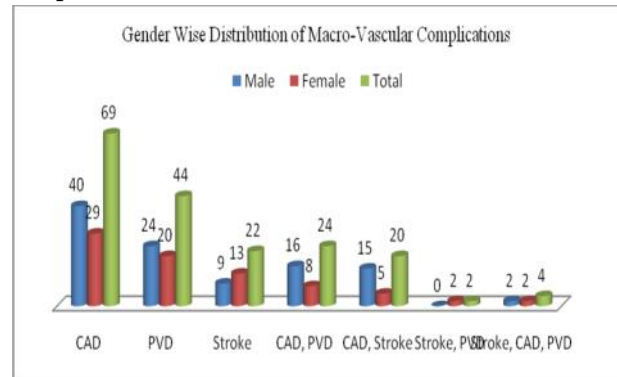
In general diabetic patients may have the risk for development of complications based on concurrent diseases and risk factors, in our study also reveals that gender-wise distribution in both micro and macrovascular complications. Out of all 215 patients, 108(50.23%) male and 80(37.20%) female with microvascular complications, 106(49.30%) male and 79(36.74%) female with macrovascular complications (table 4) [21, 22].

**Table 5: Gender Wise Distribution of Micro-Vascular Complications**

Micro-vascular complications	Male (n=108)	Female (n=80)	Total (n=188)
Retinopathy	16	15	31
Neuropathy	32	21	53
Nephropathy	38	25	63
Neuropathy & Nephropathy	10	10	20
Nephropathy & Retinopathy	5	0	5
Neuropathy & Retinopathy	4	5	9
Retinopathy, Neuropathy & Nephropathy	3	4	7

This table 5 shows the gender-wise distribution of microvascular complications present in the patients involved in our study. Out of all 215 patients, microvascular complications, nephropathy (n=63) was high followed by neuropathy (n=53); retinopathy (n=31), and males (n=108) were more prone than of females (n=80).based upon the condition that may lead to the respective complication in patients, the majority of patients may experience kidney-related abnormalities combined with supported by enhancing markers [23, 24].

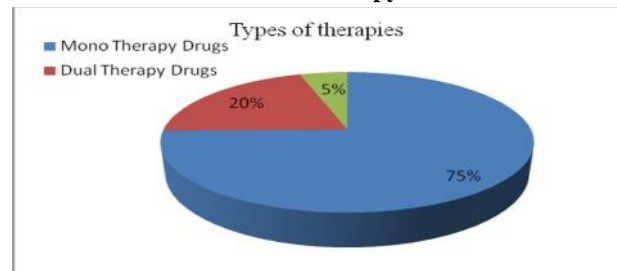
**3.6. Gender wise distribution of macro-vascular complications**



**Fig 2: Gender wise distribution of macrovascular complications**

This figure 2 shows the gender-wise distribution of macrovascular complications. Out of 185 macrovascular complications, majority were CAD (n=69); followed by PVD (n=44), Stroke (n=22) and males (n=106) were prone than that of females (n=79). Many studies to contribute to diabetes may increase the microvascular complication related to cardiovascular diseases [25, 26].

**8. Utilization of antidiabetic therapy**



**Fig 3: Utilization of antidiabetic therapy**

This shows about types of oral hypoglycemics agents used i.e., either Monotherapy or Dual therapy, or Triple therapy. Monotherapy 106 (49.30%) and dual therapy 29 (13.48%). Triple therapy 7 (3.25%) usage was less when compared to mono and dual therapy [27].

**Table 6: Overall utilization pattern of drugs**

Drug	Frequency(%)
Anti-Diabetic	395 (35.9%)
Anti-Hypertensive	157 (14.2%)
Anti-Platelets	97 (8.82%)
Analgesics	103 (9.37%)
GI drugs	115 (10.46%)
Vitamins & Minerals	91 (8.28%)
Antibiotics	106 (9.91%)
Others (HT)	35 (3.18%)
TOTAL	1099

Anti-diabetic drugs accounted for almost 36% of the prescribed drugs followed by anti-hypertensive medications, which might be due to the higher prevalence of hypertension (14.2%) among diabetic patients. The utilization of anti-platelet drugs and analgesics was 8% and 9% respectively. Furthermore, the utilization patterns of drugs used in the management of hypothyroidism were 3.18%, vitamins and minerals 8%, antibiotics 10%, gastrointestinal drugs 10.5% and others 3.18% [28].

#### 4. CONCLUSION

Among the vascular complications, microvascular complications were major in our study that was observed in almost 90 to 100% of neurological and macrovascular complications. Elevation of HbA1c levels was found to have a significant correlation with the expansion of neuropathy in patients with type 2 diabetes. The complication of neuropathy typically goes asymptomatic, unseen, and under diagnosed. Hence, it is more essential to await and to find the related complications. Monitoring and controlling the HbA1c levels are the most vital part of decreasing the complications and disease progression. Early detection and good glycemic control will help in preventing the mortality and morbidity-related risks among the diabetic population.

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**CONFLICT OF INTEREST:** The authors declare no conflict of interest, financial or otherwise.

**SOURCE OF FUNDING:** None.

**AVAILABILITY OF DATA AND MATERIALS:** Not applicable.

**CONSENT FOR PUBLICATION:** Not applicable.

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE:** PD0010/IRB/NRML/2019-20.