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Vascular Complications of Diabetes and its Associated Factors in a Rural Area of Kerala: A Hospital-Based Study

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ABSTRACT

Background: *Diabetes mellitus, one of the major lifestyle diseases, can lead to vascular complications if not diagnosed and managed early. As important as these complications might be, it is also essential to screen for other potential risk factors. This study aims to assess the prevalence of vascular complications in diabetic patients and associated risk factors.* ***Methods:*** *A cross-sectional study was conducted over 3 months among 85 diabetic patients at a tertiary care centre. A predesigned questionnaire was used to collect the demographic data and information on vascular complications was obtained by history taking and reviewing medical records. Data were coded and entered into MS Excel and analyzed using SPSS version 25.* ***Results:*** *81% of the study subjects reported having both microvascular and macrovascular complications. Microvascular complications were reported in 11% and macrovascular complications were reported in 2%. The majority of the study participants reported having diabetic retinopathy (83%), neuropathy (79%), nephropathy (75%), and cardiovascular complications (76%). Having hypertension (p=0.004) and dyslipidemia (p=0.012) as comorbidities was found to be significantly associated with the occurrence of vascular complications in diabetic patients.* ***Conclusions:*** *Higher prevalence of diabetic vascular complications in our study points toward the importance of screening and early detection of the same. Glycemic control, lipid control, and regular blood pressure monitoring are essential in diabetic patients.*

Keywords: Complications, Diabetes, Vascular, Rural, Kerala

INTRODUCTION

Diabetes mellitus, a fast-growing potential epidemic in India, is characterized by hyperglycemia. It is a long-term

metabolic disorder with variable clinical manifestation and progression. The prevalence in urban areas ranges between 10.9% and 14.2% and the prevalence in rural India was 3.0%-7.8% among the population aged 20 years and above with a much higher prevalence among individuals aged over 50 years [1]. The shift in diabetes prevalence from urban to rural areas and affluent to less privileged has been notable [2]. The common reasons cited for this shift are poor diabetic control, lack of awareness, and limited access to healthcare [3, 4]. The management of diabetes includes not only control but also regular screening for vascular complications with simultaneous assessment of other risk factors.

With the increasing burden of Diabetes, the bulk of associated complications are ever increasing. The formation of advanced glycation end products, oxidative stress, and endothelial damage lead to micro and macrovascular complications [1]. The macrovascular complications include coronary artery disease, peripheral arterial disease, and stroke while microvascular complications include nephropathy, neuropathy, and retinopathy. The prevalence of diabetes-related vascular complications ranges from 5% to 37% in India [5, 6]. Glycemic control in diabetes and prevention of the development of vascular complications is the key to halting the epidemic of noncommunicable diseases headed by Diabetes mellitus.
Most of the previous literature focuses on a single complication or either macrovascular complications or microvascular complications. Also, there is a dearth of studies in South India on the topic of diabetic complications. This study aims to assess the prevalence of diabetes-related complications and associated factors if any.

METHODS

A cross-sectional study was conducted from October 2019 to December 2019 among 85 diabetic patients presenting at the Medicine outpatient department and diabetic clinics at a tertiary care centre in a rural area of Malappuram district. The study included patients above 30 years of age and excluded those who were pregnant at the time of the study.

After taking informed written consent, the patients were interviewed using a predesigned questionnaire. Information on demographic details, socio-economic status, smoking, and alcohol intake was obtained and on micro vascular and macro vascular complications by both history taking and reviewing medical records. Lab investigation reports including glycosylated hemoglobin were referred to for further information.

Ethical clearance was obtained from the Institutional Ethical Committee of MES Medical College, Malappuram before the commencement of the study. Data were coded and entered into MS excel and analyzed using SPSS version 25. A p-value of <0.05 was considered significant. Pearson's Chi-square test was used to compare categorical variables and the Fisher exact test when expected values were less than 5.

RESULTS

More than half (53%) of the study subjects were elderly. Gender distribution was almost equal. The majority of the study participants reported no smoking addiction (63.5%) and no alcohol usage (85%). The majority of the study subjects gave a history of dyslipidemia (63.5%) and a history of hypertension (74%) (Table 1).

Table 1 Sociodemographic characteristics of the study population

Demographic variables		Frequency	Percent
Age groups	<60	40	47.1%
	≥ 60	45	52.9%
Gender	Females	42	49.4%
	Males	43	50.6%
Educational status	Illiterate	11	12.9%
	Primary	28	32.9%
	Secondary	26	30.6%
	Higher Secondary	16	18.8%
	Degree	4	4.7%
Marital status	Currently married	62	72.9%
	Widowed	19	22.4%
	Divorced	4	4.7%
Smoking history	Nil	54	63.5%
	Previous smoker		28.2%
	Current smoker	7	8.2%
Alcohol addiction	Nil	72	84.7%
	Previous	8	9.4%
	Currently	5	5.9%
History of dyslipidemia	No	31	36.5%
	yes	54	63.5%
History of hypertension	No	22	25.9%
	yes	63	74.1%

69 (81%) of the study subjects reported having both macrovascular and microvascular complications. Either microvascular complications or macrovascular complications were reported by 11% and 2% of the study subjects respectively. Only 5 (6%) patients had no complications (Figure 1). The majority of the study participants reported having diabetic retinopathy (83%), neuropathy (79%), nephropathy (75%), and cardiovascular complications (76%) (Table 2).

Table 2 Distribution of study subjects according to vascular complications

Complications		Frequency	Percent
Microvascular	Retinopathy	71	83.50%
	Neuropathy	67	78.80%
	Nephropathy	64	75.30%
Macrovascular	CNS	17	20%
	CVS	65	76.50%

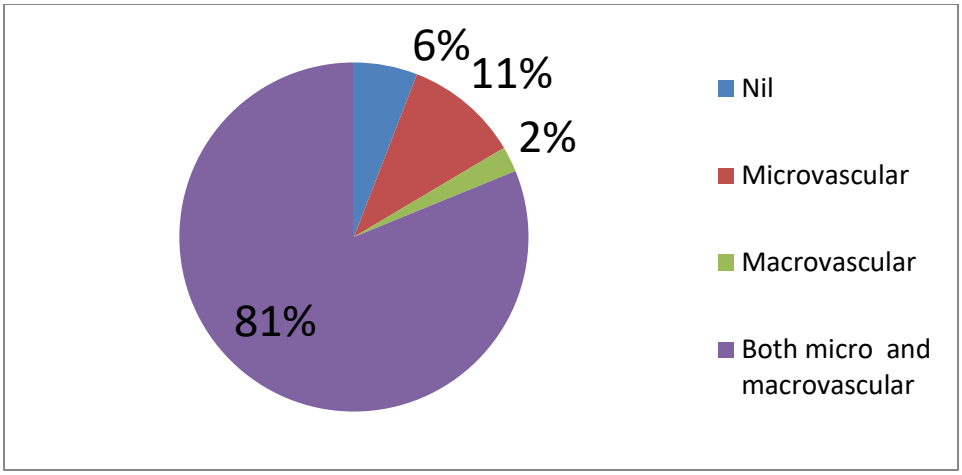

Figure 1 Distribution of study subjects according to vascular complications

Out of 45 study participants who were aged 60 years and above, 38 presented with both microvascular and macrovascular complications. But the association was not found to be significant. Similarly, the gender differences in the occurrence of vascular complications were not found to be significant. History of smoking (p=0.083) and alcoholism (p=0.43) had no association with diabetic vascular complications (Table 3).

Out of 63 study subjects who were hypertensive, 57 presented with both macrovascular and microvascular complications. Microvascular and macrovascular complications were presented by 6.3% and 1.6% respectively. The association was found to be statistically significant (p=0.004). 74% of the diabetic patients with dyslipidemia as comorbidity, presented with both macrovascular and microvascular complications. 1.7% presented with microvascular and 3.7% presented with macrovascular complications. The association was found to be statistically significant (p=0.012) (Table 3).

Table 3 Socio-demographic characteristics and diabetic vascular complications

Age	Complications				Total	Calculated value	p-value*
	Nil	Microvascular	Macrovascular	Micro and macrovascular			
<60	3	4	2	31	40	0.32	3.502
≥ 61	2	5	0	38	45		
Gender							
Female	1	4	0	37	42	0.16	5.162
Male	4	5	2	32	43		
H/o hypertension							
No	4	5	1	12	22	0.004	13.307
Yes	1	4	1	57	63		
H/o dyslipidemia							
No	2	0	0	29	31	0.012	10.91
Yes	3	9	2	40	54		
Diabetic duration							

<5	1	0	1	2	4	0.123	10.039
05-Oct	2	1	0	23	26		
≥ 11	2	8	1	44	55		
HbA1c							
<6.4	0	1	1	17	19	0.238	4.228
≥ 6.5	5	8	1	52	66		

Out of 55 diabetic individuals with a duration of diabetes of more than 11 years, 53 (96.4%) were found to have either microvascular or macrovascular complications or both. Out of 26 subjects with diabetes of 5 to 10 years duration, 23 had both micro and macrovascular complications. The association was not found to be significant (p=0.123). At the time of the study, 66 study participants reported having HbA1c more than 6.5. Out of those 66, fifty-two reported having both micro and macrovascular complications. Micro and macrovascular complications were reported by 12.1% and 1.5% of study participants respectively. The association was not statistically significant (p=0.238) (Table 3).

DISCUSSION

Our study focuses on a very important issue. With the increasing burden of diabetes mellitus, related vascular complications increase every year. Microvascular complications were reported by 11% and macrovascular complications by 2% while a combination of both was reported by 81%. 83% of the study subjects reported diabetic retinopathy, 79% diabetic neuropathy, and 75% diabetic nephropathy. A study done in Haryana noted the prevalence of diabetic retinopathy, neuropathy, and nephropathy to be 76%, 63%, and 69% respectively [7]. Macrovascular complications including cardiovascular and cerebrovascular complications were observed to be prevalent in 76% and 20% of our study subjects respectively. Both Coronary Artery Disease (CAD) and Cerebrovascular Disease (CVD) were found to be prevalent among 15% of the study subjects in a study done in Tamil Nadu [4].

Our study found no age-wise (p=0.32) or gender-wise (p=0.16) difference in the occurrence of vascular complications. Age was found to be a risk factor for microvascular complications in a study done by Bansal et al. Similarly, the odds of microvascular and macrovascular complications increased with age in a study done by Li et al. In a study done in Goa, increasing age and male gender were associated with an increased likelihood of exhibiting macrovascular complications. In the same study, only increasing age was noted to increase the likelihood of microvascular complications [8, 9].

Smoking and alcohol addiction had no significant effect on the presence of vascular complications in our study. In a study done in China, smoking was found to have a significant effect on the occurrence of microvascular complications [10]. Smoking was associated with an increased incidence of chronic kidney disease and cerebrovascular disease in a study done by An et al. In a multinational study, moderate drinkers had fewer cardiovascular events (cardiovascular death, myocardial infarction, and stroke) and fewer microvascular complications when compared with those who did not consume alcohol. Heavy drinking was associated with a higher risk of cardiovascular events and microvascular complications [11, 12].

The occurrence of diabetes vascular complications was significantly associated with the presence of co-morbidities like hypertension and dyslipidemia in our study. Hypertension was significantly associated with macrovascular and

microvascular complications in diabetic patients in a study done by Venguidesvarane et al. In a study done in Rajasthan, the most prevalent microvascular complications were noted to be retinopathy and neuropathy and showed a significant association with total cholesterol levels on linear regression [4, 13]. In our study, the longer the duration of diabetes mellitus, the proportion of subjects having vascular complications increased. But this was not found to be statistically significant. Kosirobod et al found increasing diabetes duration to be positively associated with both micro and macrovascular complications [14]. Though not statistically significant, an increased proportion of vascular complications was noted in diabetic individuals with HbA1c≥6.5 in our study. Venguidesvarane et al found higher HbA1c levels to be significantly associated with an increased risk of diabetic vascular complications [4].

CONCLUSION

Our study shows a higher prevalence of both microvascular and macrovascular complications in the study subjects. Hence, the importance of screening for complications in diabetic patients. Hypertension and dyslipidemia were found to be significant risk factors. In addition to glycemic control, equal importance should be laid on lipid and blood pressure control in diabetic patients. Educating the public about diabetes-related complications and lifestyle modifications should be the aim.

DECLARATIONS

Conflict of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical clearance

approved by the Institutional Ethical Committee of MES medical college, Malappuram, Kerala, India.

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REFERENCES

[1] Silvya Grace, B., and Soma I. Sundaram. "Evaluation of Vascular Complications in Patients with Type 2 Diabetes Mellitus at a South Indian Tertiary Care Hospital." *Age,* Vol. 9, No. 1, 2021 pp. 35-50.

[2] Pradeepa, R., and V. Mohan. "Prevalence of type 2 diabetes and its complications in India and economic costs to the nation." *European journal of clinical nutrition,* Vol. 71, No. 7, 2017, pp. 816-824.

[3] Deepa, M., et al. "Knowledge and awareness of diabetes in urban and rural India: the Indian Council of Medical Research India diabetes study (phase I): Indian Council of Medical Research India diabetes 4." *Indian journal of endocrinology and metabolism,* Vol. 18, No. 3, 2014, p. 379.

[4] Govindarajan Venguidesvarane, A., et al. "Prevalence of Vascular Complications Among Type 2 Diabetic Patients in a Rural Health Center in South India." *Journal of Primary Care & Community Health,* Vol. 11, 2020.

[5] Agrawal, R., et al. "Prevalence of micro and macrovascular complications and their risk factors in type-2 diabetes mellitus." *Journal of the Association of Physicians of India,* Vol. 62, 2014, p. 505.

[6] Raman, Rajiv, et al. "Prevalence and risk factors for diabetic microvascular complications in newly diagnosed type II diabetes mellitus. Sankara Nethralaya Diabetic Retinopathy Epidemiology and Molecular Genetic Study (SN-DREAMS, report 27)." *Journal of Diabetes and its Complications,* Vol. 26, No. 2, 2012, pp. 123-128.

[7] Kumar, Ashok, et al. "Prevalence and correlates of microvascular complications among patients with diabetes mellitus: a cross-sectional study." *International Journal of Research in Medical Sciences,* Vol. 8, No. 8, 2020, pp. 3039-44.

[8] Bansal, Dipika, et al. "Microvascular complications and their associated risk factors in newly diagnosed type 2 diabetes mellitus patients." *International journal of chronic diseases*. 2014, pp. 1-4.

[9] Li, Jialin, et al. "Prevalence and associated factors of vascular complications among inpatients with type 2 diabetes: a retrospective database study at a tertiary care department, Ningbo, China." *PloS one,* Vol. 15, No. 6, 2020, p. e0235161.

[10] Bui, Huyen-Dieu T., et al. "Prevalence of and factors related to microvascular complications in patients with type 2 diabetes mellitus in Tianjin, China: a cross-sectional study." *Annals of Translational Medicine,* Vol. 7, No. 14, 2019, p. 325.

[11] An, Jaejin, et al. "Prevalence and incidence of microvascular and macrovascular complications over 15 years among patients with incident type 2 diabetes." *BMJ Open Diabetes Research and Care,* Vol. 9, No. 1, 2021, p. e001847.

[12] Blomster, Juuso I., et al. "The relationship between alcohol consumption and vascular complications and mortality in individuals with type 2 diabetes." *Diabetes care,* Vol. 37, No. 5, 2014, pp. 1353-59.

[13] Srigouri, Thalikota, and Kotina Shridevi. "Creating awareness of rabies in pupil of ZP High School in Kallur (V), Kurnool (Dist), Andhra Pradesh." *International Journal of Community Medicine and Public Health,* Vol. 5, No. 6, 2018, pp. 2338- 44.

[14] Kosiborod, Mikhail, et al. "Vascular complications in patients with type 2 diabetes: prevalence and associated factors in 38 countries (the DISCOVER study program)." *Cardiovascular diabetology,* Vol. 17, No. 1, 2018, pp. 1-13.