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An analytical study of the prevalence and prescribed pattern vascular complication for type II diabetic patient in Indian tertiary care hospitals

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ABSTRACT

Diabetes mellitus (DM) is a common metabolic disorder. It is associated with complications which will affect the quality of life. Failure to control elevated blood sugar or inadequate treatment of diabetes could cause many complications. A prospective observational study is used to assess the prevalence of diabetic vascular complications in 105 types of II diabetic patients. A date was collected regarding patient's demographic and clinical characteristics. Based on our study criteria, males were more when compared to females in getting vascular complications & also. Complications were more prominent in the age group of 50-65years. Of all microvascular complications, Nephropathy was major, whereas, in macro-vascular complications, CAD was prominent. Poor glycemic control and a long length of ailment appear to be the most significant danger factors for these complexities. Doctors assume a significant function to endorse hostile to diabetic meds and Pharmacist plays a sharp task to assess the medicine design so as to accomplish fruitful treatment. The currently anti-diabetic drugs are effective, but a lot of factors such as patient adherence, education related to diabetes, lifestyle modification, cost and type of medication have an association with glycemic control. The commonly prescribed anti-diabetic drug was Insulin. Metformin was the most preferred drug both as monotherapy and combination therapy. Although polypharmacy was observed, drug utilization pattern can be rational owing to a higher prevalence of complications. Minimization of the occurrence of complications should be courage by early diagnosis, intensive blood glucose control and rational drug selections.

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INTRODUCTION

Diabetes Mellitus (DM) is a common metabolic disorder & is defined as "A metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in the insulin secretion, insulin action, or both" (WHO), which requires life-long medical care and ongoing patient self-management and support to prevent acute complications and to reduce the risk of mor-

bidity and mortality. (American Diabetes Association, 2013) High glucose is the sign of diabetes that expands the danger of complexities. Inability to control raised glucose or deficient treatment of diabetes could cause numerous inconveniences (World Health Organization, 1999). Generally, the injurious effects of diabetes are separated into macro-vascular complications (coronary artery disease, peripheral arterial disease, and stroke) and microvascular complications (diabetic nephropathy, neuropathy, and retinopathy). (Fowler, 2008)

These complications related to DM pose a significant health care burden and affects the overall quality of life. (Mohan *et al.*, 2013) Effective management of DM requires stringent and sustained glycemic control to lower the risk of macro & micro-vascular complications. In 2015, in excess of 415 million grown-ups have DM internationally, and this number is assessed to increment to 642 million by 2040. India is one of the focal points of the worldwide DM plague and has the second-most elevated number of individuals with the infection on the planet ~69 million people as of 2015. (Litwak *et al.*, 2013) The micro-vascular and macro-vascular complications of DM account for most of the morbidity and mortality associated with the disease.

Studies were done in Chennai (2000-2008) revealed that the prevalence of diabetic retinopathy (DR) was 17.6%, micro-albuminuria was 26.9%, neuropathy was 26.1%, coronary artery disease (CAD) was 21.4% and peripheral vascular disease (PVD) was 6.3%. (IDF Diabetes Atlas, 2015) Poor glycemic control and a long duration of illness seem to be the most important risk factors for these complications. Also, these long term complications develop gradually as the age advances making the elderly more prone. According to the International Diabetes Federation, Four out of every five people with diabetes now live in developing countries, with most affected men and women of working age. Diabetes and its risk factors increase the risk of myocardial infarction by 3-6 times. Similarly, it increases the risk of heart failure by 2-3 times, risk of amputation 45 times, blindness 10-25 times and Kidney failure 15-20 times.

(Rema *et al.*, 2005) The currently anti-diabetic drugs are effective, but a lot of factors such as patient adherence, education related to diabetes, lifestyle modification, and cost and type of medication have an association with glycemic control. (Unnikrishnan *et al.*, 2007; Pradeepa *et al.*, 2008) Medication costs, regimen complexity, and irrational prescribing are the challenges for patient compliance and therapy adherence that consequences will lead to poor glycemic control and increase the morbidity and mortality. Study on anti-diabetic prescribing patterns provides useful insights into the current prescribing evaluation, and it eventually leads to achieving rational drug therapy, optimal glycemic control and reduces the health-care cost for patients and society in a large scale.

MATERIALS AND METHODS

Study type

This was the Multi-Centre, prospective observational study. All the patients who meet inclusion criteria were taken as the study population.

Study site

This study was carried out in Manipal tertiary care Hosptial, Vijayawada.

Study Population and Inclusion and Exclusion Criteria

The study population of this study was all diabetic patients had complete medical records. The patients who met the inclusion criteria were enrolled in the study. The inclusion and exclusion criteria were as follows.

Sample Size

The study population is of 105 patients.

Study duration

From July 1^{st} to November 1^{st} 2019

Data Collection

Data collection form was developed to collect the data, which includes demographic details and medication list.

Data Entry and Analysis

We choose paired *t*-test, Co-relation and regression, and anova test. These all statistical procedures analyzed by Statistical program for the Social and sciences (SPSS-26version)

RESULTS AND DISCUSSION

Based on the study criteria, 105 cases were selected and taken for the study. Of the total patient majority were male (58.09 N: 61) in comparison to female (41.90, N: 44) and 49 (46.6%) were belonged to the age group 50-65 years and 45 (42.8%) were in the age group >65. According to the body mass index (BMI), 10 (9.5%) of the patient has normal weight followed by 41 (39.04%) were overweight and 54 (51.4%) patients were obese. Of the 105 patients, 16(15.23%) were suffering from diabetes for <5 years followed by 52(49.5%) and 37(35.2%)

had type 2 diabetes mellitus for 5-10 years and >10 years respectively. The glycosylated haemoglobin (HbA1c) level was mostly observed in the study population was between 7.1 – 8.5. Among comorbidities hypertension, 59 (56.19%) Is most prevalent among cardiovascular complication (Mohan *et al.*, 2001).

Age

The Mean value for age is 62.16, and Standard Deviation (SD) is 12.193, and Standard Error Mean (SEM) is 1.561, i.e., (Mean ± SD) = (62.16 ±12.193). T value for age is 39.819, and 95%CI is 59.04 lower, 65.29 upper Figure 1.

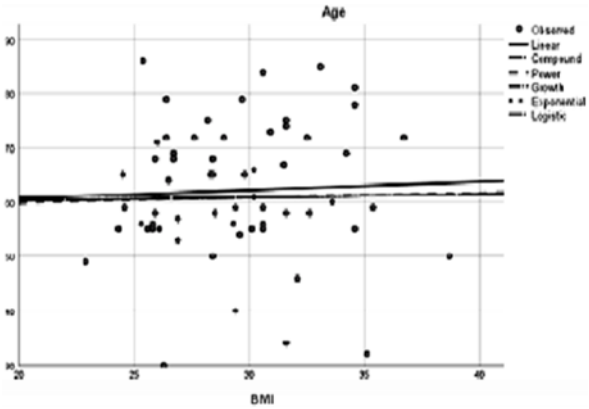

Figure 1: This graph represents the relation between the Age and BMI of the patients

RBS & HbA1c

RBS: Mean value is 230.82, Standard Deviation (SD) is 114.536, and Standard Error Mean (SEM) is 14.787. Hba1c- mean value is 7.08, Standard Deviation (SD) is 1.672, and Standard Error Mean (SEM) is 0.216. RBS & HbA1c Correlation value is 0.263, Sig. is 0.042. RBS, HbA1c mean is 223.737; Standard Deviation (SD) is 114.107; 95% Confidence Interval (CI) is 194.260 lower; 253.214 upper.

Table 1: Age-wise distribution of Diabetic Vascular Complications

Complication	Age		
	35-50yrs	50-65yrs	>65yrs
Micro-vascular	4	22	23
Macro-vascular	2	26	23
None	1	6	6

Table 1, shows that, age-wise distribution of diabetic vascular complications. From that table, Age group>65 years were having more microvascular complications, whereas the age group 50-65 years were having more macro-vascular complications.

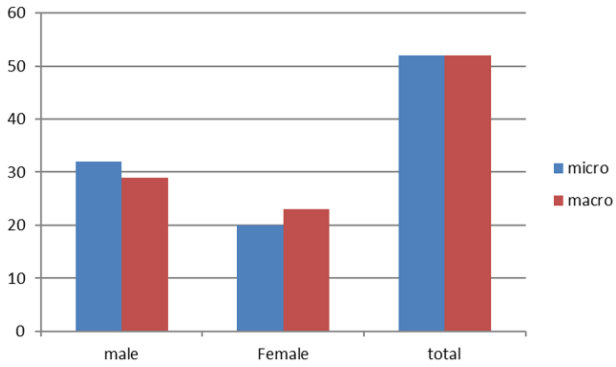

Figure 2: Gender wise distribution of Micro & Macrovascular Complications

Figure 2, shows gender-wise diabetic vascular complications. Out of 52 Micro-vascular complications, 32 were male, 20 were female patients. Whereas from 52 Macro-vascular complications, 29 were male, 23 were female patients. This shows that males were very prone to having Diabetic vascular.

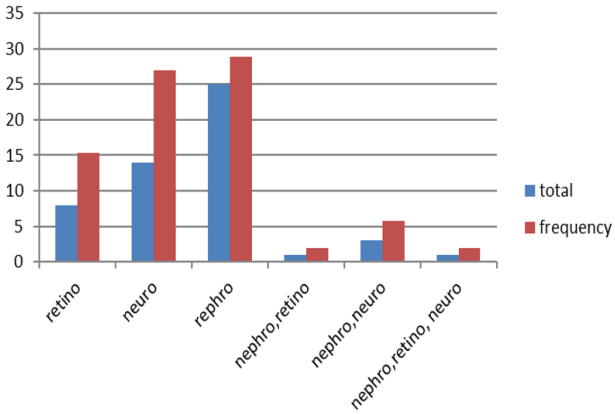

Figure 3: Overall distribution of microvascular complications

Figure 3, shows the overall distribution of microvascular complications. Of all 52 micro-vascular complications, Nephropathy (n=25, 48.07%) complication was major followed by Neuropathy (n=14, 26.9%), Retinopathy (n=8, 15.3%), Nephropathy & Neuropathy (n=3, 5.76%), Nephropathy & Retinopathy (n=1, 1.9%), and Nephropathy, Neuropathy & Retinopathy (n=1,1.9%). (Premalatha *et al.*, 2000; Unnikrishnan *et al.*, 2016)

Table 2, shows the overall distribution of macrovascular complications. Of all 52 macro-vascular complications CAD (n=30, 57.6%) were major, followed by Stroke (n=8, 15.38%), PVD (n= 8, 15.3%), CAD, PVD (n=3, 5.76%), and CAD, Stroke (n=3,5.76%). (Dulal and Karki, 2009; Juarez *et al.*, 2006)

Figure 4, shows different therapies used by type II diabetic patients in our study. Of all these therapies,

Table 2: Macro-vascular complications include Stroke, CAD, and Peripheral vascular disease

Macro-vascular Complications	Total	Frequency (%)
CAD	30	57.69
PVD	8	15.3
CAD, PVD	3	5.76
CAD, Stroke	3	5.76

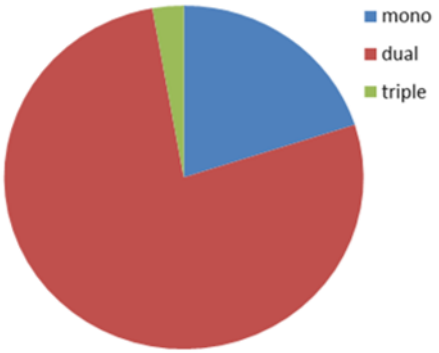

Figure 4: Mono, Dual & Triple therapies of Diabetic drugs used

Table 3: Type of Hypoglycemic Agents Prescribed (n=105)

Types of Hypoglycemic agents	Frequency (%)
Insulin	54(51.4)
Sulphonyl ureas	31(29.5)
Biguanides	78(74.2)
Sitagliptin	7(6.6)
Teneligliptin	5(4.7)

dual therapy usage was mostly identified.

Table 3, shows the overall usage of Hypoglycemic agents. Of all them, Insulin (n=54, 51.4%) were mostly used.

The combinational usage pattern of Anti-Diabetic agents

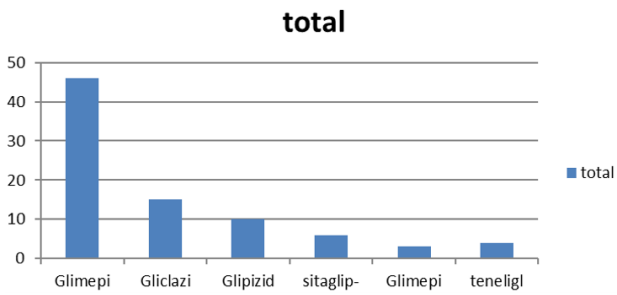

Figure 5: Combinational drugs used by diabetic patients in this study

Figure 5, shows the combinational usage of drugs prescribed for type II diabetic patients. Of all them, Glimepiride + Metformin (n=46, 43.8%) was mostly commonly prescribed, followed by Gliclazide + Metformin (n=15, 14.28); Glipizide + Metformin (n=10, 9.52); Sitagliptin + Metformin (n=6, 5.7); Teneligliptin + Metformin (n=4, 3.8); Glimepiride + Metformin + Voglibose (n=3,2.8). (Rhee *et al.*, 2005)

Table 4: Overall Utilization Pattern of Drugs (n=438)

Drugs	Frequency (%)
Anti-Diabetic	175(39.9)
Anti-Hypertensive	77(17.5)
Anti-Platelets	59(13.4)
Statins	32(7.3)
Analgesics	25(5.7)
GI drugs	75(17.1)
Vitamins & Minerals	17(3.8)
Others	21(4.79)
Levothyroxine	17(3.8)

Table 4, shows the overall utilization pattern of drugs. Of all them, Anti-diabetic drugs accounted for almost (n=175, 40%) followed by Anti-hypertensive medications, which might be due to the higher prevalence of hypertension (n=77, 17.57%) among diabetic patients (Piette *et al.*, 2004). The utilization of anti-platelets and lipid-lowering drugs were (n=59, 13.4%) and (n=32, 7.3%) respectively. Furthermore, the utilization patterns of drugs used for pain were (n=25, 5.7%) and GI drugs were (n=75,17%) (Nitin, 2010).

CONCLUSIONS

As per the findings of the study, type II DM was more prominent among male gender and was highly prevalent on age group over 50 years of age. At least one chronic complication was found in 65 (61.9%) of the study population. The reasons for a higher prevalence of complications might be the longer duration of diabetes, poor glycemic control, as observed in the study. The observed diabetic complications were as follows viz. retinopathy (n=8, 15.3%), nephropathy (n=25, 48.07%), neuropathy (n=14, 26.9%), CAD (n=30, 57.6%), Stroke (n=8, 15.38%), PVD (n= 8, 15.3%). The overall utilization pattern of drugs were as follows viz. anti-diabetics (n=175, 40%), anti-hypertensive (n=77, 17.57%), anti-platelets (n=59,13.4%), lipid-lowering agents (n=32, 7.3%).

Among anti-diabetic drugs, metformin (n=37, 35.2%) was the most preferred agent both as

monotherapy and combination therapy. Although polypharmacy was observed, drug utilization pattern can be rational owing to a higher prevalence of complications. Minimization of the occurrence of complications should be encouraged by early diagnosis, intensive blood glucose control and rational drug selections.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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REFERENCES

American Diabetes Association 2013. Standards of medical care in diabetes–2013. *Diabetes care*, 36(1):11–66.

Dulal, R. K., Karki, S. 2009. Disease Management Programme for Diabetes Mellitus in Nepal. *Journal of Nepal Medical Association*, 48(176):281–286.

Fowler, M. J. 2008. Microvascular and Macrovascular Complications of Diabetes. *Clinical Diabetes*, 26(2):77–82.

IDF Diabetes Atlas 2015. International Diabetes Federation. Second Edition, [Accessed: 8 August 2016].

Juarez, D. T., *et al.* 2006. Factors Associated With Poor Glycemic Control or Wide Glycemic Variability Among Diabetes Patients in Hawaii. *Preventing Chronic Disease*, 9:120065.

Litwak, L., *et al.* 2013. Prevalence of diabetes complications in people with type 2 diabetes mellitus and its association with baseline characteristics in the multinational A1chieve study. *Diabetology & Metabolic Syndrome*, 5(1):57.

Mohan, V., *et al.* 2001. Prevalence of coronary artery disease and its relationship to lipids in a selected population in South India. *Journal of the American College of Cardiology*, 38(3):682–687.

Mohan, V., *et al.* 2013. Current glycemic status and diabetes-related complications among type 2 diabetes patients in India: data from the A1chieve study. *The Journal of the Association of Physicians of India*, 61(1 Suppl):12–15.

Nitin, S. 2010. HbA1c and factors are other than diabetes mellitus affecting it. *Singapore Med J*, 51(8):616–622.

Piette, J. D., *et al.* 2004. Problems Paying Out-of-Pocket Medication Costs Among Older Adults With Diabetes. *Diabetes Care*, 27(2):384–391.

Pradeepa, R., *et al.* 2008. Prevalence and risk factors for diabetic neuropathy in an urban south Indian population: the Chennai Urban Rural Epidemiology Study (CURES-55). *Diabetic Medicine*, 25(4):407–412.

Premalatha, G., *et al.* 2000. Prevalence and risk factors of peripheral vascular disease in a selected South Indian population: the Chennai Urban Population Study. *Diabetes Care*, 23(9):1295–1300.

Rema, M., *et al.* 2005. Prevalence of Diabetic Retinopathy in Urban India: The Chennai Urban Rural Epidemiology Study (CURES) Eye Study, I. *Investigative Opthalmology & Visual Science*, 46(7):2328–2333.

Rhee, M. K., *et al.* 2005. Patient Adherence Improves Glycemic Control. *The Diabetes Educator*, 31(2):240–250.

Unnikrishnan, R., *et al.* 2007. Prevalence and Risk Factors of Diabetic Nephropathy in an Urban South Indian Population: The Chennai Urban Rural Epidemiology Study (CURES 45). *Diabetes Care*, 30(8):2019–2024.

Unnikrishnan, R., *et al.* 2016. Diabetes mellitus and its complications in India. *Nature Reviews Endocrinology*, 12(6):357–370.

World Health Organization 1999. Definition, diagnosis and classification of diabetes mellitus and its complications : report of a WHO consultation. Part 1, Diagnosis and classification of diabetes mellitus. page 59.