Research article *Rapports De Pharmacie* Vol.7 (2), 2021, 30-41
ISSN: 2455-0507

PREVALENCE OF DIABETIC COMPLICATIONS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS (T2DM) IN WARANGAL

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ABSTRACT
The aim of this study was to evaluate the prevalence of diabetic complications among the people with T2DM and educate them regarding their disease and its associated risk factors, provide awareness to improve the HRQOL of patients to prevent the further complications. It is a multicenteric, prospective observational study conducted in the MGM hospital, Warangal, Sri Bhadrakali Diabetic Clinic, Dr. Sathyam's clinic, Care Diabetic Centre, VishwasSuperspeciality Hospital & Dialysis centre, Sri VenkateshwaraMultispeciality Hospital, Hanamakonda, Telangana.Among the total subjects (n=1080) enrolled in the study, the incidence of different complications such as Hypertension (82%), Diabetic Neuropathy (43.1%), cardiovascular diseases (20.1%), Diabetic Nephropathy (11.8%), Diabetic Retinopathy (22.5%), Diabetic Foot Ulcers (3.7%), Insomnia (3.1%), Amputations (2.6%), Crebrovasular diseases (2.2%) and Depression (1.1%) were recorded.In this study we conclude that disease burden, duration of diabetes, older age, glycaemic parameters, HBA1C levels were significantly associated with macro vascular and microvascular complications. Furthermore, we estimated prevalence of depression 1.1% and referred them to psychiatry. Therefore, targeting the prevention strategy to control the modifiablerisk factors, routine screening for detection of new complications, diabetic profile, need to be emphasized to reduce the prevalence of diabetic complications, in order to prevent morbidity and mortality.

Keywords: Diabetic Neuropathy, Diabetic Nephropathy, Cardiovascular diseases, Diabetic Retinopathy, Depression.

INTRODUCTION

Diabetes mellitus is a set of metabolic disorders characterized by hyperglycaemia resulting from a defect in insulin secretion, insulin action or both [1]. T2DM has become an observably global public health problem [2]. The number of people with type 2 diabetes mellitus (T2DM) has been increasing worldwide due to aging, urbanization, lifestyle changes (sedentary life style), social economic conditions and reduced physical activities, dietary habits (south India is high carbohydrate consuming country with rice, tubers being the major food intake) and obesity [3]. Uncontrolled hyperglycemia results in serious macrovascular and microvascular complications such as diabetic neuropathy, cardiovascular diseases, diabetic retinopathy, diabetic nephropathy etc. Early detection of these diabetic complications contributes in improving quality of life among T2DM Patients.

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DIABETIC NEUROPATHY

T2DM is frequent cause of peripheral neuropathy. When the blood glucose and blood are not controlled, diabetes can harm the nerves, most commonly starts with peripheral sensory nerves. Causing tingling and numbness loss lo vibration sense loss of balance and limb position[4].The diabetic neuropathy most commonly occurs due poor glycaemic parameters, lack of physical exercise, unawareness regarding the disease. Untreated conditions lead to major infections [5].

CARDIOVASCULAR DISEASES

Most of the diabetic patients experience the greater risk of cardiovascular diseases such as ischemic heart disease myocardial infarction (MI).When compared to the non-diabetic population cardiovascular diseases [6]. Endothelial dysfunction and autonomic neuropathy are often present in T2DM patients and may contribute to the development of CVD [7].

HYPERTENSION

Hypertension is defined as a sustained diastolic BP greater than 90mmHg accompanied by the elevated systolic BP more than 140mmHg [8].Hypertension is also known as a high blood pressure (HBP) is an extremely common complication in diabetic patients. HBP is a long-

term medical condition in which the blood pressure in the arteries in persistently elevated [9].

CEREBROVASULAR COMPLICATIONS

The brain is the site of both macro vascular and micro vascular complications of diabetes. The micro vessel structural and functional damage due to acute and chronic hyperglycaemia lead to increased incidence and worsened outcomes from stroke in diabetic patients. Patients with diabetes mellitus are at markedly increased risk of death due to cerebrovascular diseases like stroke, and this is true of both T1DM and T2DM [10].

PERIPHERAL ARTERY DISEASES

People with diabetes are the higher risk of developing atherosclerosis, the most common cause of peripheral artery disease (PAD). And the individuals with PAD have much higher risk of heart attack or stroke [11].

DIABETIC RETINOPATHY

Diabetic retinopathy well known as a potentially sign- threatening complication of T2DM.This is the micro vascular complication which can harm the sight and cause blindness in several ways it is commonly detected in adults.

DIABETIC NEPHROPATHY

Diabetic nephropathy is one of the most important microvascular complications, it can be detected by the earliest manifestation of urinary micro albumin, albumin/creatinine ratio. DM is an increasingly important cause of renal failure, and indeed has now become the single most common cause of end-stage renal disease which requires either dialysis or kidney transplantation [12].

DIABETIC FOOT ULCERS

Diabetic foot ulcer is a major complication of diabetes, and it is most commonly occurred at the feet, lower legs. In some conditions patients with T2DM experiences any injury or infections to the foot, skin on the feet does not heal properly/quickly. It is prone to developing an ulcer which is in turn leads to develop several microorganisms at the effect area (e.g. E. coli, Pseudomonas, Staphylococcus aureus, Klebsiella species, Citrobacter species [11].

NON-TRAUMATIC AMPUTATIONS

Amputation is the surgical removal of a limb or body part. It is performed to remove diseased tissue or relieve pain due to trauma. It is characterised the nerve damage in the feet or poor blood flow to the feet that increases risk of various foot complications.

DEPRESSION

Depression is a common mental disorder characterised by depressed mood, loss of interest or pleasure, feeling of guilt or low self-wroth, disturbed sleep, loss of appetite, low energy, poor concentration [12].

INSOMNIA

Insomnia is subjectively characterized as a complaint of difficulty falling asleep, difficulty maintaining sleep.

DYSLIPIDEMIA

Dyslipidaemia is a disorder of lipoprotein metabolism, DLP raise the total cholesterol, and triglycerides concentrations, and decrease in the good high- density lipoprotein (HDL) cholesterol concentration in the blood. Which increases to risk of cardiovascular and peripheral artery diseases.

HYPERLIPIDEMIA (HLP)

Hyperlipidaemia is the major microvascular complication in T2DM patients. Hyperlipidaemia is a condition in which elevated lipid (fat) levels in the blood. It is caused by having too much LDL cholesterol in your blood and not enough HDL cholesterol to clear it up.

MICROALBUMINURIA

Microalbuminuria is a microvascular complication in diabetic patients. This can be diagnosed in early diabetes It is the condition moderate increase in the level of urine albumin [13].

MATERIAL AND METHODS

It is a multicenteric, prospective observational study conducted in the Mahatma Gandhi Memorial Hospital (MGMH) Warangal, Sri Bhadrakali Diabetic Clinic, Dr. Sathyam's clinic, Care Diabetic Centre, VishwasSuperspeciality Hospital & Dialysis centre, Sri Venkateshwaramultispeciality Hospital, Hanamakonda, Telangana.

STUDY CRITERIA

Inclusion criteria:

1. Patients diagnosed with T2DM aged above 30 years.
2. Patients having any of diabetic complications will be included.

Exclusion criteria:

1. Patient with T1DM.
2. Pregnant women with gestational diabetes.
3. Patients diagnosed with T2DM and established complications will be excluded.

RESULTS AND DISCUSSION

The clinical study was carried out with 1080 patients in multicentericprospective observational study who presented with Diabetic complications. A total of 1080 patients were enrolled in this multicentric prospective observational study, in Warangal. Among them,

results were found to be hypertension (82%), diabetic neuropathy (43.1%), cardiovascular diseases (20.1%), diabetic nephropathy (11.8%), diabetic retinopathy (22.5%), diabetic foot ulcers (3.7%), insomnia (3.1%), amputations (2.6%), cerebrovasular diseases (2.2%) and depression (1.1%).

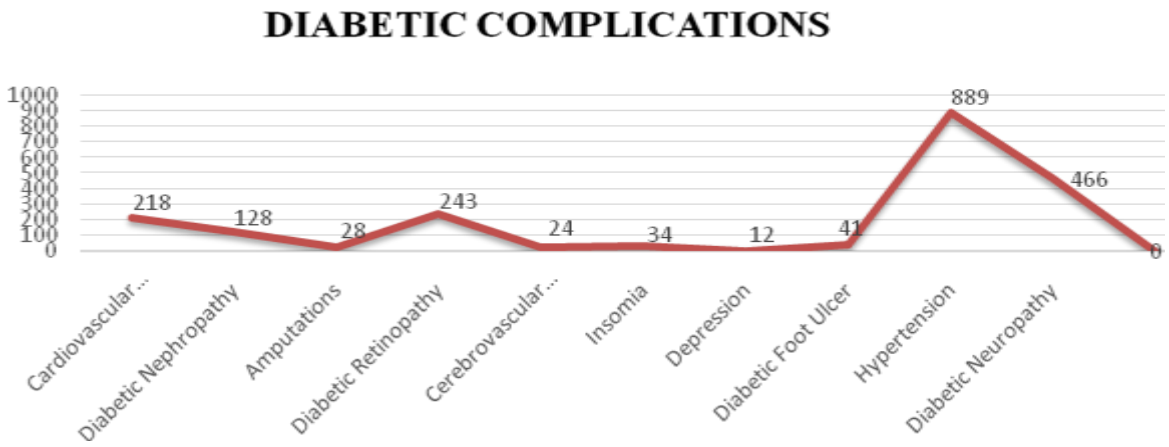


Figure 1: Diabetic complications suffered by subjects

Table 1: Regional distribution of patients

Region	No. of patients
Rural	692
Urban	388

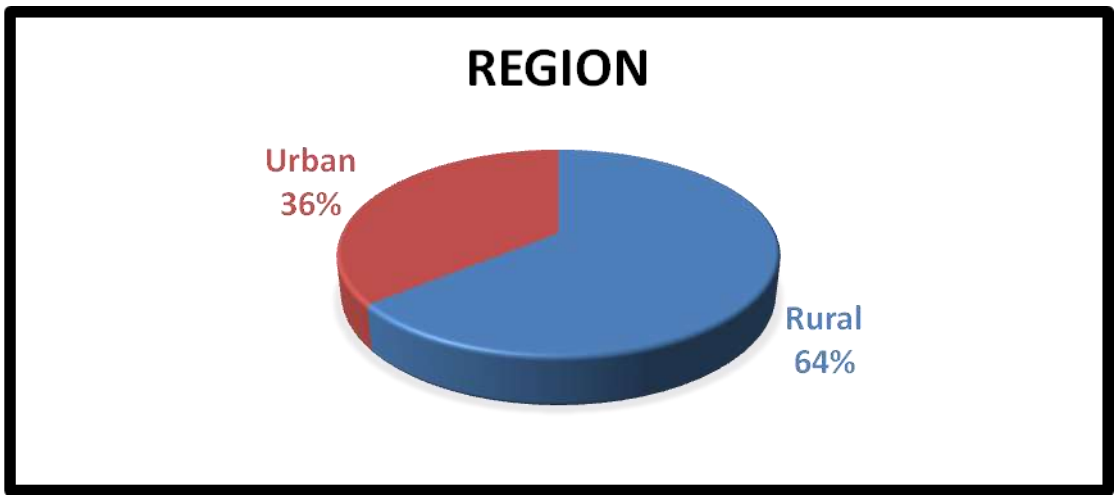


Figure 2: Regional distribution of subjects

Table 2: Gender distribution of patients

Gender	No. of patients
Male	545
Female	536

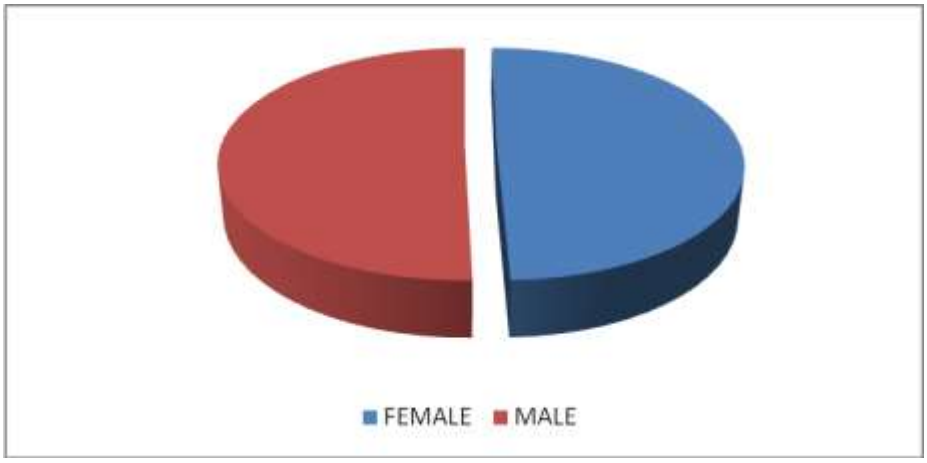


Figure 3: Gender distribution of patients

Table 3: Age distribution of patients

Age	No. of patients	Percentage
20-30	7	0.64
31-40	67	6.20
41-50	312	28.8
51-60	389	36.01
61-70	242	22.4
71-80	60	5.5
81-90	3	0.2

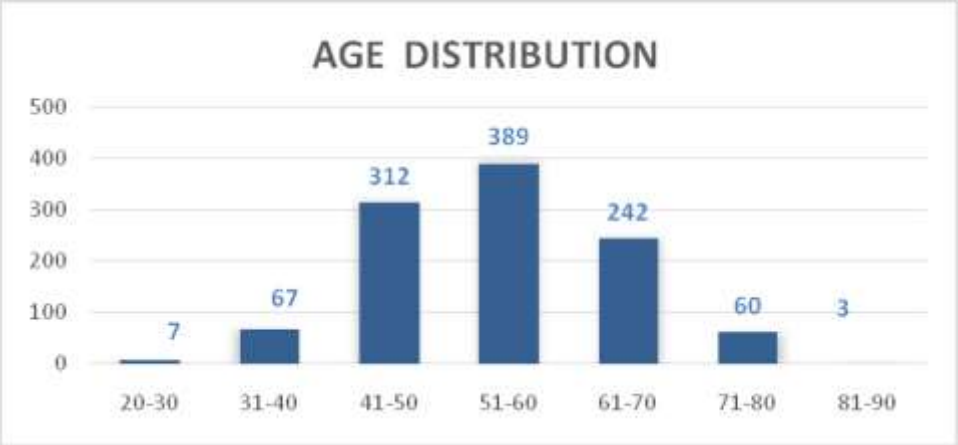


Figure 4: Age distribution of patients

Table 4: Diabetic profile of patients

	1 VISIT		2 VISIT		3 VISIT	
PARAMETERS	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
FBS	**140.499**	**50.54**	**132.31**	**46.104**	**128.36**	**46.104**
PLBS	**220.71**	**73.41**	**206.6**	**64.74**	**202.07**	**62.673**

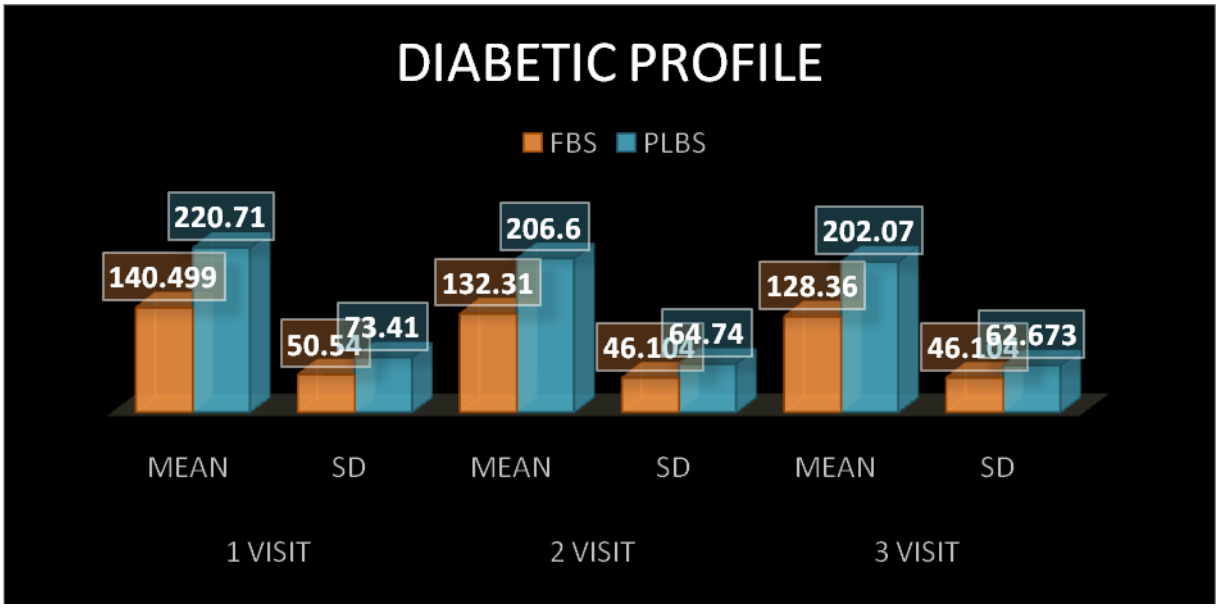


Figure 5:Diabetic profile of patients

Table 5: Body mass index of patients

BMI	NO.OF PEOPLE	PERCENTAGE
11-15	7	0.6%
16-20	52	4.8%

21-25	629	58.2%
26-30	356	32.96%
31-35	29	2.6%
36-40	7	0.6%

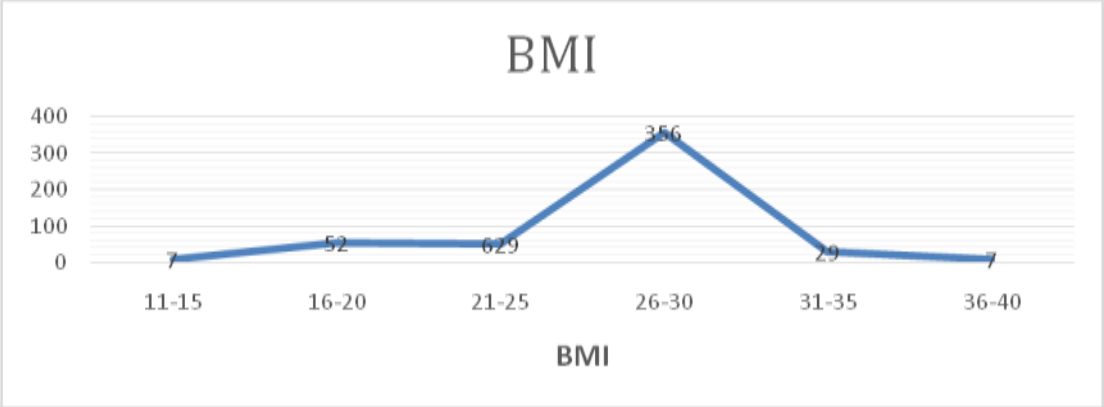


Figure 6: Body mass index of patients

Table 6: HbA1c profile of patients

HBA1C	**VISIT-1**		**VISIT-2**	
	MEAN	**SD**	**MEAN**	**SD**
	8.09	1.4	7.01	1.3

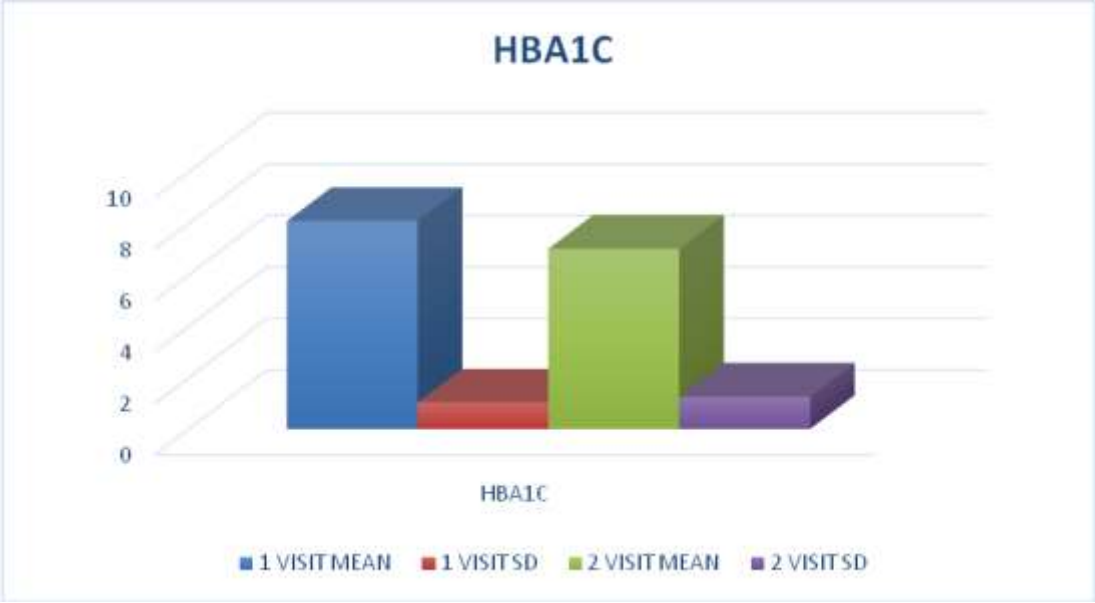


Figure 7: HbA1c profile of patients

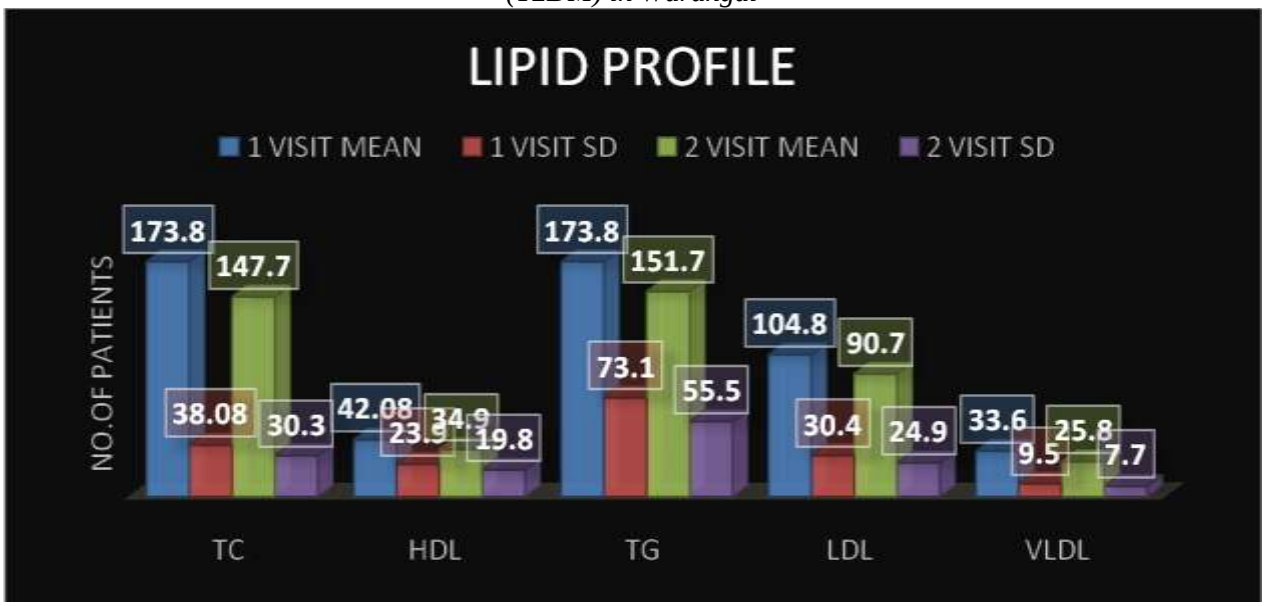


Figure 8: Lipid profile of patients

TC: 173.8±38.08, 147.7±30.3

HDL: 42.08±23.9, 34.9±19.8

TG: 104.8±30.04, 90.7±24.9.

LDL: 104.8±30.04, 90.7± 24.9

VLDL:33.6±9.5,25.8±7.7

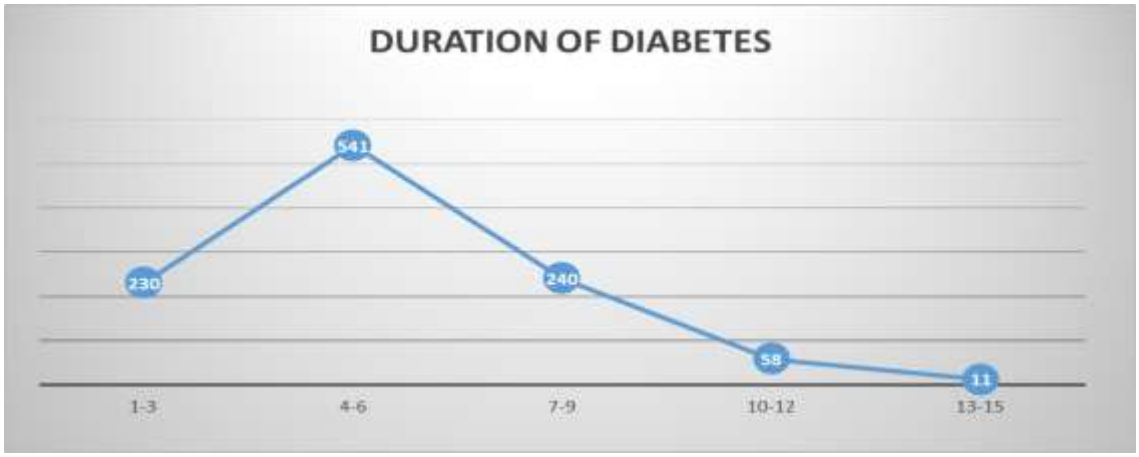


Figure 9: The duration of diabetes of patients

Table 7: Blood pressure of patients

	1 VISIT		2 VISIT	
PARAMETERS	MEAN	SD	MEAN	SD

SYSTOLIC	133.4	20.05	126.9	18.4
DIASTOLIC	84.9	41.6	80.2	10.3

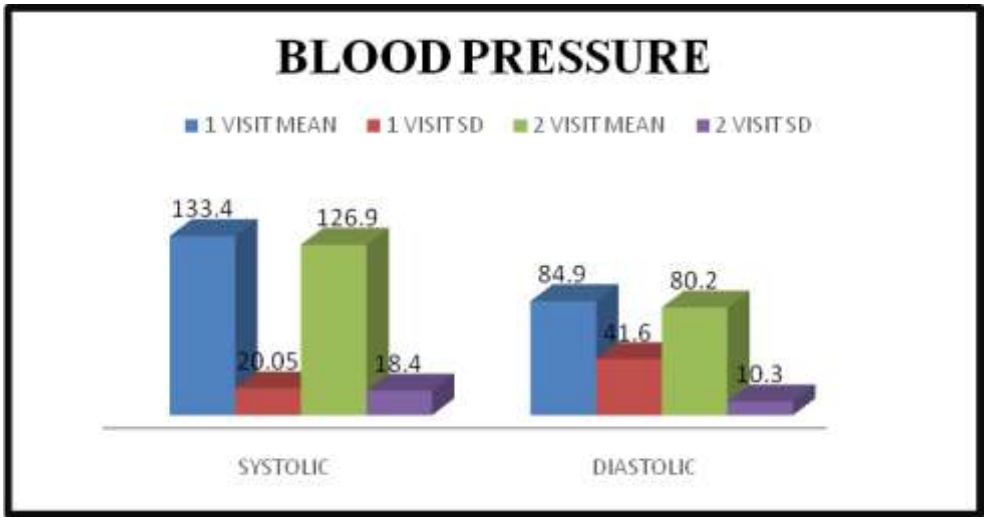


Figure 10: Blood pressure of patients

Figure 11: Diabetic complications suffered by subjects

a. Cataract

b. Diabetic foot ulcer

c. Diabetic retinopathy

d. Amputation

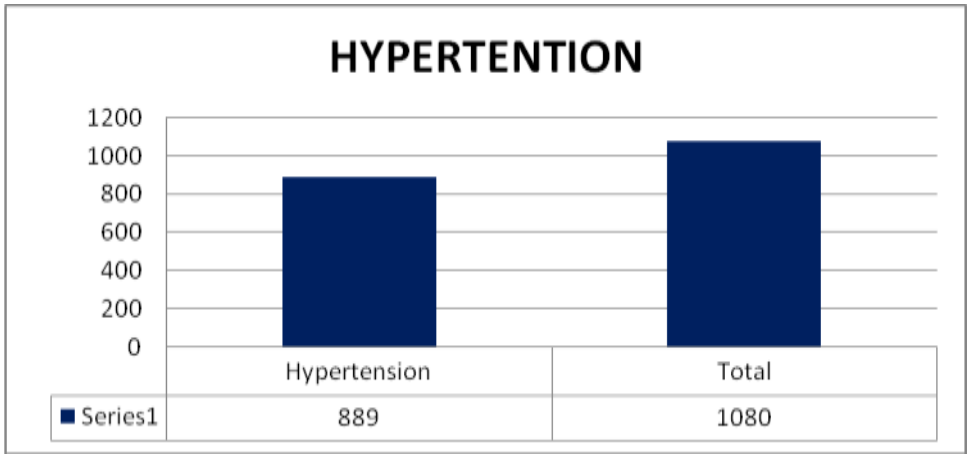


Figure 12: Number of subjects suffered from hypertension

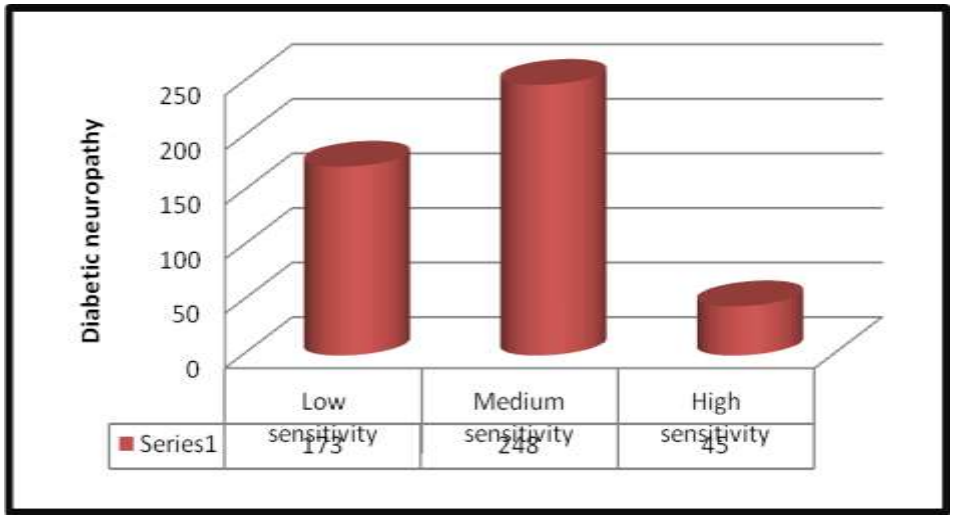
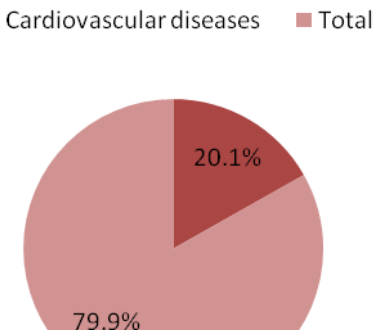
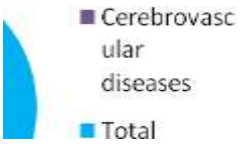


Figure 13: The number of subjects suffered from diabetic neuropathy according to disease severity

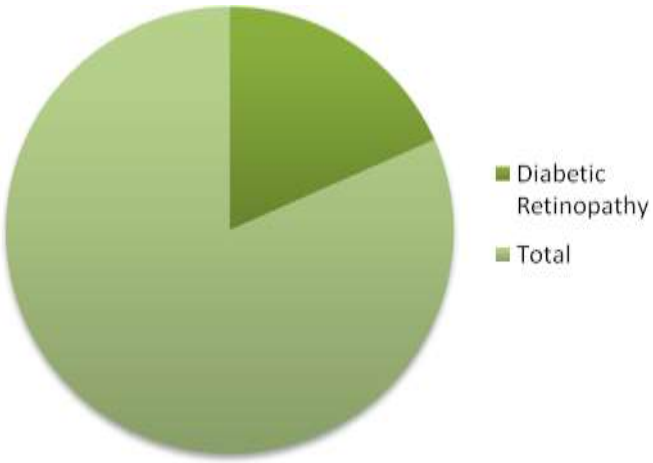
a. Cardiovascular diseases



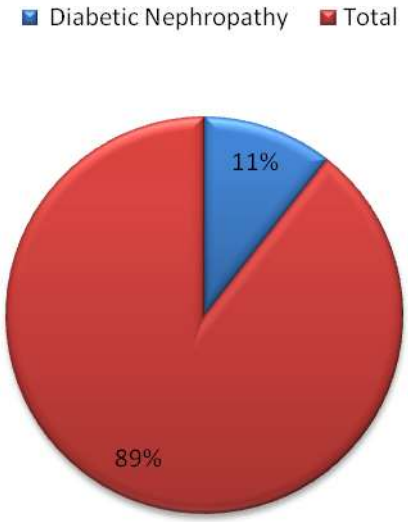
b. Cerebrovascular diseases



c. Diabetic Retinopathy



d. Diabetic Nephropathy



e. Diabetic Foot Ulcer

f. Amputations

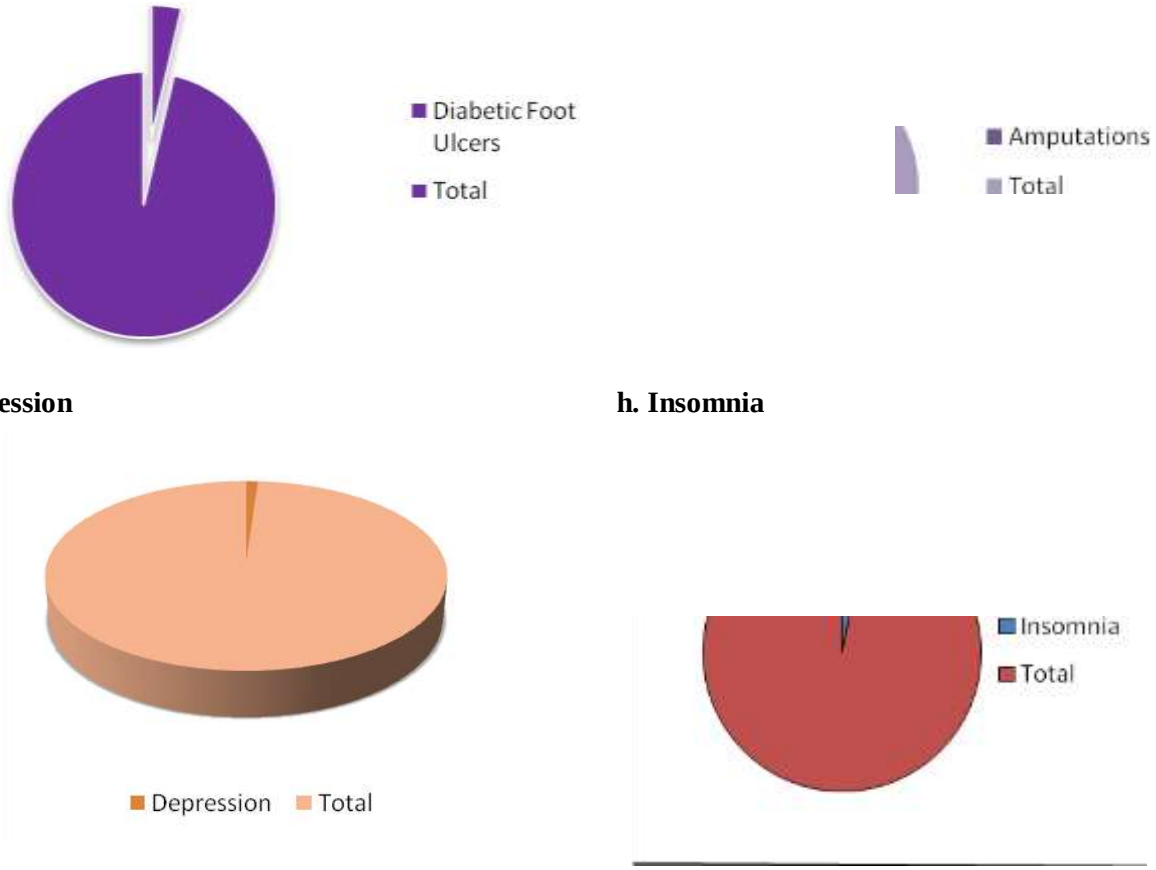


Figure 14: The proportion of subjects suffered from diabetic complications

CONCLUSION

This study is evidence for highest prevalence of chronic Microvascular and Macrovascular complications. Through this study hypertension was found to be 82%, diabetic neuropathy 43%, cardiovascular disease 20.1%, diabetic nephropathy 11.8%, diabetic retinopathy 22.5%, diabetic foot ulcers 3.7%, cerebrovascular diseases 2.1%, hyperlipidemia 4.2%, insomnia 3.1%, amputations 2.6%, depression 1.1%. The increased disease burden, duration of diabetes, older age, and glycaemic parameters, HBA1C levels were significantly associated with macro vascular and microvascular complications. Furthermore, we estimated prevalence of depression 1.1% and referred them to psychiatry. Therefore, targeting the prevention strategy to control the modifiable risk factors, routine screening for detection of new complications, diabetic profile, need to be emphasized to reduce the prevalence of diabetic complications, in order to prevent morbidity and mortality.

ACKNOWLEDGEMENT

Authors are thankful to the Principal, Dr.C.Srinivas Reddy & Secretary, Dr.Ch.Devender Reddy for giving us opportunity to work and providing necessary facilities to carry out this Research work.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

[1] Lebovitz HE. Insulin resistance: definition and consequences. Experimental and clinical endocrinology & diabetes. 2001;109 (Suppl 2):S135-148.

[2] Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. Nature. 2001 Dec;414 (6865):782-787.

[3] Gupta R, Misra A. Type 2 diabetes in India: regional disparities. The British Journal of Diabetes & Vascular Disease. 2007 Jan;7(1):12-6.

[4] Dipiro JT, Talbert RL, Yee Ge pharmacotherapy: A pathophysiologic approach 8th edition. United states: Graw Hill education: 2011:2246-2247

[5] Kohei KA. Pathophysiology of type 2 diabetes and its treatment policy. JMAJ. 2010 Feb;53(1):41-46.

[6] Siddiqui SA, Bano KA, Shabbir I, Bashir S, Hussain R. Prevalence of dyslipidemia in Patients with type-2 diabetes mellitus. Pakistan Journal of Medical Research. 2011;50(1):29.

[7] Russell J Greene, Norman D Harris, 7JN, Pathophysiology and Therapeutics for pharmacists: A basis for clinical pharmacy practice. 3rdedition. United states: 2008:604

[8] Donald LJ, Robert A, Mercedes C, Giovaani DS, et al, Heart diseases and stroke statistics-2009 update: Statiscs Subcommitee. Criculation. 2009; 119 (3): 121-181.

[9] Astrup J, Siesjö BK, Symon L. Thresholds in cerebral ischemia-the ischemic penumbra. Stroke. 1981 Nov;12(6):723-725.

[10] Capes SE, Hunt D, Malmberg K, Pathak P, Gerstein HC. Stress hyperglycemia and prognosis of stroke in nondiabetic and diabetic patients: a systematic overview. Stroke. 2001 Oct 1;32(10):2426-32.

[11] Kohei KA. Pathophysiology of type 2 diabetes and its treatment policy. JMAJ. 2010 Feb;53(1):41-46.

[12] Das S, Swain SK, Tripathy SK. Diabetic Complications in Indian Scenario: An Update.

[13] Maxine A, Papadakis, MD, Stephen J, et.al, Current medical Diagnosis & Treatment 59 edition, Mc GrowHill Education. 2020: 2883-2902.