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Original Research

Assessment of Risk Factors Associated with Diabetes

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Abstract

Primary Study Objective: Purpose of the study was to assess to risk factors of diabetes type II and complications in diabetic patient of tertiary care hospital. Methods/Design: Cross sectional study conducted to evaluate the risk factors associated with diabetes Mellitus. Setting: Tertiary hospitals of Islamabad and Azad Kashmir was selected for the current study. Participants: 50 patients assessed without any gender discrimination age between 35 to 85 years for risk factors and complications. Intervention: Data was collected from patients that were bed ridden admitted in hospitals. A total of 50 patients were included in this study with age limit more than 35 years and without any discrimination of gender. Primary Outcome Measures: In tertiary care hospitalized patient's obesity, inactivity and family history were the major risk factor for diabetes mellitus type 2 and we calculated the obesity, inactivity and family history percentage in diabetic patients 63%, 49% and 67% respectively. Results: Percentage of risk factors calculated the obesity, inactivity and family history in diabetic patients 63%, 49% and 67% respectively. Macro vascular complications in patients with diabetes mellitus type 2 were stroke 3%, angina 8%, hypertension and cognitive impairment have highest percentages i.e., 78%. 46% patients were suffering from ulceration; gangrene and amputation have percentages 19% and 3% respectively. Patients with microvascular complications of diabetic nephropathy were assessed for their albuminuria 25%, edema 32% and incontinence 28%. Conclusion: These complications can be avoided if patients of DM type 2 adopt a healthy lifestyle, do exercise and monitor their blood glucose levels regularly. Patients should also control their blood pressure to avoid damage to their microvasculature.

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Introduction

Diabetes mellitus is a metabolic illness with numerous etiologies defined by hyperglycemia and disturbances in carbohydrate, lipid, and protein metabolism caused by abnormalities in insulin production, insulin action, or both. [1].

Polyuria, Polydipsia, and Polyphagia characterize DM. If DM is not treated and remains for long time it may cause serious problems like retinopathy, nephropathy, and neuropathy [2]. Individual is diagnosed as diabetic when fasting blood sugar level is (BSF) 126 mg/dl or greater. For this test subject did not allow to eat for at least 8 hours. For a random blood glucose sample taken at any time, the diagnosis is made if the blood sugar level is (BSR) 200 mg/dl or greater [3].

Insulin is a hormone that controls the absorption of glucose from the blood into most cells and is released by beta-cells in the pancreas' islet of Langerhans (Primarily muscle and fat cells, but not central nervous system cells). As a result, insulin insufficiency or receptor insensitivity plays a key role in all types of diabetes mellitus. [4].

Classification of diabetes mellitus

1) Type I diabetes
2) Type II diabetes
3) Gestational diabetes

Other two types include LADA and MODY. There is a common thread that runs across all kinds of diabetes mellitus. Blood glucose levels that are too high can harm the small blood vessels in the kidneys, heart, eyes, and neurological system. If not addressed, it can lead to cardiac disease, stroke & renal failure. [5].

Type I Diabetes

Insulin-dependent diabetes is another name for type 1 diabetes. Diabetes type 1 is an autoimmune disease. It is caused by the immune system targeting the body's pancreas. The labels type 1diabetes, juvenile diabetes, and insulin-dependent diabetes mellitus have all been replaced by terminologies like child-onset diabetes, juvenile diabetes, and insulin-dependent diabetes mellitus (IDDM). [6] A hereditary condition may be to blame for this kind of diabetes. Sometimes patients with autoimmune develop insulin resistance because of weight gain or genetic factors. This condition is called double diabetes. [7]

Diabetes diagnose test

The A1C blood test is a routine test that measures level of glucose in the blood. [8]

1) Urine test
2) Postprandial plasma glucose test
3) Oral glucose tolerance test
4) Intravenous glucose tolerance test
5) Fasting glucose test
6) O Sullivan test
7) Plasma insulin test

Type II Diabetes

Type 2 diabetes, often known as adult-onset diabetes, is becoming more common. Non-insulin-dependent diabetes was another name for type 2 diabetes. [9]

Type 2 diabetes is usually a lesser form of diabetes than type 1, but it can still cause serious health problems, especially in the body's tiniest blood arteries [10].

Blood test for type II diabetes

An A1C test is a blood test that estimates average glucose levels in the blood. [11]

Gestational Diabetes:

Gestational diabetes is a kind of diabetes that is brought on by pregnancy. Because high blood sugar levels in a mother's blood are passed through the placenta to the baby, gestational diabetes must be managed to preserve the baby's growth and development. Although gestational diabetes normally goes away once the baby is born, it puts mothers at risk of getting type 2 diabetes later. [12]

Gestational diabetes puts the unborn baby in danger, even more so than the mother. [13].

Treatment

Oral Hypoglycemic Medications

Sulfonylureas (glipizide, glyburide, gliclazide, glimepiride)
Meglitinides (repaglinide and nateglinide)
Biguanides (metformin)
Thiazolidinediones (rosiglitazone, pioglitazone)
α-Glucosidase inhibitors (acarbose, miglitol, voglibose)
DPP-4 inhibitors (sitagliptin, saxagliptin, vildagliptin, linagliptin, alogliptin)
SGLT2 inhibitors (dapagliflozin and canagliflozin)
Cycloset (bromocriptine)

Complications

Acute complications:

a. Diabetic ketoacidosis.
b. Hyperosmolar Non-ketonic coma.
c. Hypoglycemic coma

Chronic Complications:

a. **Kidney** i.e., Nephropathy, Glomerular microangiopathy, Urinary infections, Glycogen nephrosis.
b. **Eye** i.e., Retinopathy, Cataract infections
c. **Nervous System** i.e., Neuropathy, Cerebrovascular atherosclerotic disease, Peripheral neuropathy,
d. **Skin, Infections** i.e., Necrobiosis, Xanthomas,
e. **Cardiovascular system** i.e., Coronary **e.** atherosclerosis, Peripheral atherosclerosis,
f. **Reproductive system** i.e., increased fetal death,
g. **General** i.e., increased susceptibility to infection, Delayed wound healing.

Vascular complication:

a. Diabetic retinopathy. [14]
b. Background retinopathy. [15]
c. Diabetic nephropathy**.** [16]
d. Diabetic peripheral neuropathy**.** [17]
e. Autonomic neuropathy. [18]

Material and Methods

A cross-sectional study was accomplished of the sample size of 50 randomly selected patients with type 2 diabetes to assess the risk factors and complications in both males and female by using various diagnostic tools. Sample was collected randomly by survey of different public sector hospitals in Lahore.

Data were collected from patients that were bedridden admitted to hospitals. The investigational window was from November 2019 to September 2020. Overall 50 patients were included in this study with an age limit of more than 35 years and without any discrimination of gender. According to our interest, a piece of appropriate advice was considered from an endocrinologist, neurologist, Nephrologist, ophthalmologist professors

and assistant professors. Patients who were interviewed were suffering from co-morbidities like hypertension (HTN), cardiovascular disease (CVD), hepatitis C virus (HCV), arthritis, ulcer, stroke, allergies, tuberculosis (TB) etc., along with diabetes. Specifically, patients with diabetic complications were reviewed as the primary concern of our study.

Demographic data of patients such as age, gender, and other variables such as period of diabetes, BP and sensation were recorded. The limitation of our work in selection of patient was that all the patients had diabetes with complications.

Permission was taken from the administrators or any other authorized person at sample collection site. For a purposeful sampling, such patients included information-rich related to our topic of interest. In this regard, permission was gained from eligible patients by signing informed consent and those patients were chosen to apprehend the survey's instructions. Forms were both in English and Urdu format.

Pakistan Institute of Medical Sciences, CDA Hospital Islamabad, CMH Muzaffarabad and DHQ Pallandri. Questionnaires were filled by taking different histories from patients like past medical history (PMH), family history (FH), Physical examination such as assessment of sensation, pulse rate, BP and patient was found to establish the state of a disease shows the patient profile to access diabetic complications. We aimed to assess the risk factors of diabetes type 2 and the presence of vascular complications in tertiary care hospital settings.

Inclusion and exclusion criteria for diabetic complications patients

Inclusion criteria:

• Patients with diabetes age more than 35 years and lesser than 85 years
• Patients with type 2 diabetes.
• Bedridden hospitalized patient.

Exclusion criteria:

• Other patients with ages lesser than 35 years and more than 85 years were.
• Patients with type 1 diabetes.
• Patients from OPD.

Results were computed and evaluated using various diagnostic techniques after data was collected from patients. After performing calculations, graphs were plotted on a Microsoft Excel spreadsheet to analyze the prevalence of DM in both males and female's prevalence of micro and macro-vascular complications.

Results

This research project was conducted to assess risk factors and the presence of vascular complications in type 2 diabetic patients in a tertiary care hospital setting.

In tertiary care hospitalized patient's obesity, inactivity and family history were the major risk factor for diabetes mellitus type 2 and we calculated the obesity, inactivity, and family history percentage in diabetic patients 63%, 49% and 67% respectively (Figure 2.1)

Macrovascular complications in patients with diabetes mellitus type 2 were stroke 3%, angina 8%, hypertension (HTN) and cognitive impairment have highest percentages i.e., 78%. 46% of patients suffered from ulceration; gangrene and amputation have percentages of 19% and 3%, respectively (Figure 2).

Microvascular complications such as retinopathy, neuropathy and nephropathy were assessed separately. Diabetic Neuropathy includes numbness, muscle cramps, foot ulcer and tingling in feet. 71% of the patients were suffering from numbness, 63% patients had muscle cramps, 18% patients with foot ulcers and 52% of patients felt tingling in their feet.

Patients with microvascular complications of diabetic nephropathy were assessed for their albuminuria, edema and incontinence. Patients had albuminuria 25%, 32%patients with peripheral edema and 22% patients with urine incontinence.

Diabetic retinopathy disturbs the visual ability of patient and visual problems was 60% in patients, glaucoma was 9%, cataract 4% and blindness was 1% among the patients with diabetes type 2.

Discussion

DM type 2 has various risks such as obesity, inactivity, family history, high cholesterol, hypertension, impaired glucose tolerance and age of more than 35 years are common. An obese person has high-fat content in total body mass the fattier tissue, the more resistant cells become to insulin that why patients with DM type 2 are mostly obese. The lesser the activity level, the larger risk of DM type II because physical activity helps resist body weight, utilize glucose as energy, and make cells more sensitive to insulin. 49% patients with diabetes type 2 have low activity level. If a parent or sibling has type 2 diabetes, the risk rises.

Type II diabetes can also impact big blood arteries, causing plaque to form, leading to macrovascular issues, such as a heart attack or stroke. Higher percentages of hypertension (HTN) (78%) and cognitive impairment (78%). In type 2 diabetic patient's lipid profile is disturbed and body uses fats as source of energy. The higher levels of triglycerides and cholesterol lead to hypertension.

When patients with type 2 diabetes are re-diagnosed, they already have nerve damage symptoms. Peripheral neuropathy Diabetes is the most prevalent type of nerve injury, affecting the nerves that go through the hands and feet. Neurons use glucose solely as a source of energy, and in type 2 diabetic patients neurons fail to use glucose as energy source, resulting damage occurs to the neurons. Patients with type 2 diabetes who have not managed their blood glucose effectively for a long period may lose feeling in their feet. Patients' involvement numbness (71%), muscle cramps (63%), foot ulcer (18%) and tingling in feet (52%).

Uncontrolled diabetes (or poorly managed) can lead to renal failure, in which the kidneys are unable to effectively clear the blood. Diabetic nephropathy may cause weakness of kidney functions albuminuria (25%), peripheral edema (32%), urine incontinence (22%), dialysis and kidney transplant. Microalbuminuria, a disease that is an early symptom of kidney issues, should be examined every year to prevent diabetic nephropathy. The test determines the amount of protein in the urine. When the kidneys fail, they begin to discharge an excessive amount of protein. Prescriptions can help to inhibit further damage, once microalbuminuria is detected.

High blood glucose level for a longer time can cause visual problems (60%), glaucoma (9%), cataract (4%) and blindness (1%).

Conclusion

Our study related to risk factors indicates high risks of Type II Diabetes if the person is obese, inactive and has a family history. Obese and inactive persons should adopt a healthy lifestyle. Exercise should be the part of their daily routine life. Obese persons should lose body fat which will improve their insulin sensitivity. Obese person should have balanced diet and monitor their cholesterol levels annually. In our studies we have concluded the poor prognosis of type 2 DM, leads to the Macro-vascular complications i.e., stroke, angina, HTN, cognitive impairment, ulceration, and gangrene. These complications increase disease burden and cost of therapy. Hypertensive patients should monitor their blood pressure regularly and monitor their cholesterol levels. Patients suffering from diabetic foot ulceration should control their blood glucose levels. Persistent elevated blood glucose levels lead to microvascular complications, i.e., nephropathy, neuropathy, and retinopathy. These complications lead to increased disease burden and increased cost of therapy. These complications can be avoided if patients of DM type 2 adopt a healthy lifestyle, do exercise, and monitor their blood glucose levels regularly. Patients should also control their blood pressure to avoid damage to their microvasculature.

The above-mentioned complications, the cost of therapy and the disease burden can be reduced by proper diagnosis and management of the disease and by educating the diabetic patients about complications and management of diabetes

Competing Interest:

There is no conflict of interest among authors.

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	Normal	Prediabetes	Diabetes
A1C	≤ 5.6 %	5.7 – 6.4 %	≥ 6.5 %
FPG	≤ 99 mg/dL	100 – 125 mg/dL	≥ 126 mg/dL
		(5.6 – 6.9 mmol/L)	(7.0 mmol/L)
OGTT	1313 ≤ 139 mg/dL	100-140-199 mg/dL (7.8 – 11.0 mmol/L)	≥ 200 mg/dL (11.1 mmol/L)
RPG			≥ 200 mg/dL (11.1 mmol/L)

Drug-Drug interactions

Drugs	Interactions
Metformin HCl + Hydrochlorothiazide	Pharmacodynamic antagonism
Glimepiride + Hydrochlorothiazide	Pharmacodynamic antagonism
Metformin + Enalapril	Increase toxicity of metformin
Metformin + Humulin	Pharmacodynamic synergism
Metformin + Amlodipine	Pharmacodynamic antagonism
Sitagliptin + Glimepiride	Pharmacodynamic synergism
Insulin + Aspirin	Pharmacodynamic synergism
Metformin + Verapamil	Pharmacodynamic antagonism
Glimepiride + Diclofenac	Pharmacodynamic synergism
Metformin + Nifedipine	Pharmacodynamic antagonist
Vildagliptin + Hydrochlorothiazide	Pharmacodynamics antagonism
Metformin + Fluoxetine	Pharmacodynamic synergism
Glimepiride + Aspirin	Pharmacodynamic synergism
Metformin + Escitalopram	Pharmacodynamic synergism
Glimepiride + Insulin	Pharmacodynamic synergism

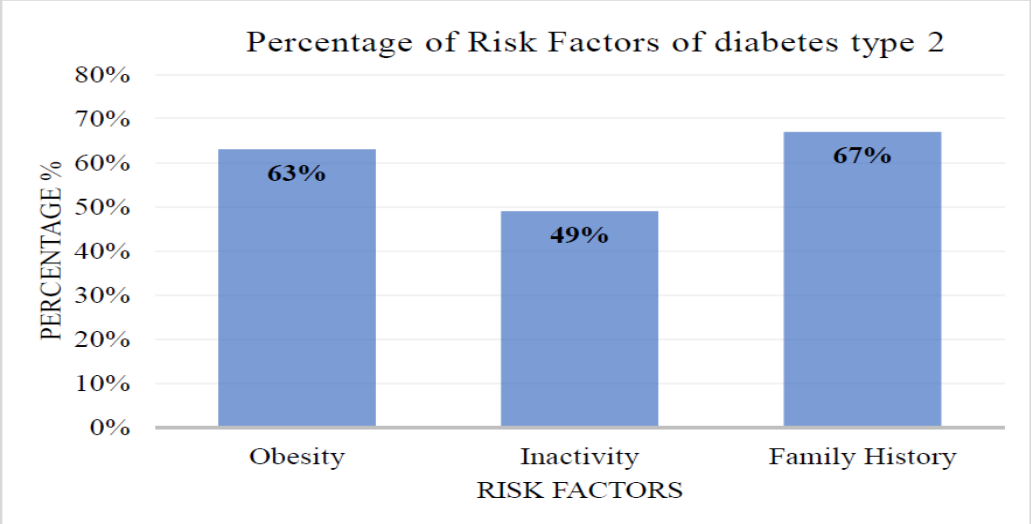

Figure 1: Percentage of risk factors of diabetes type 2

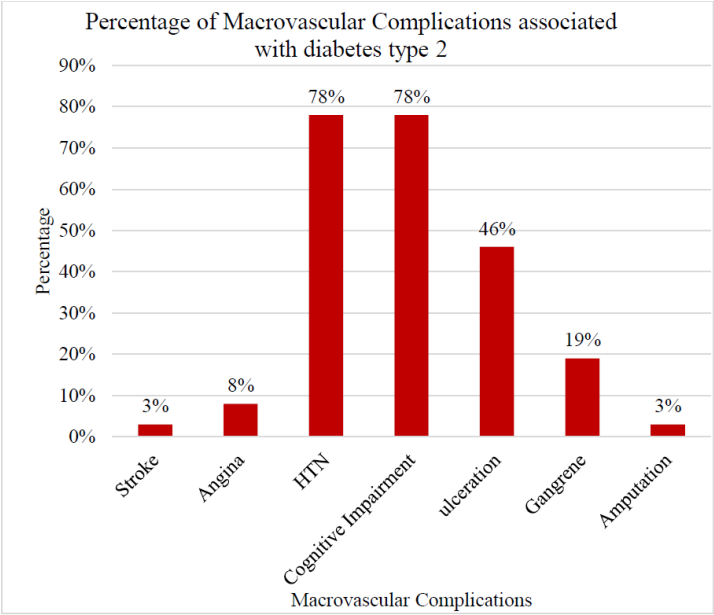

Figure 2: Percentage of macrovascular complications associated with type 2 diabetes

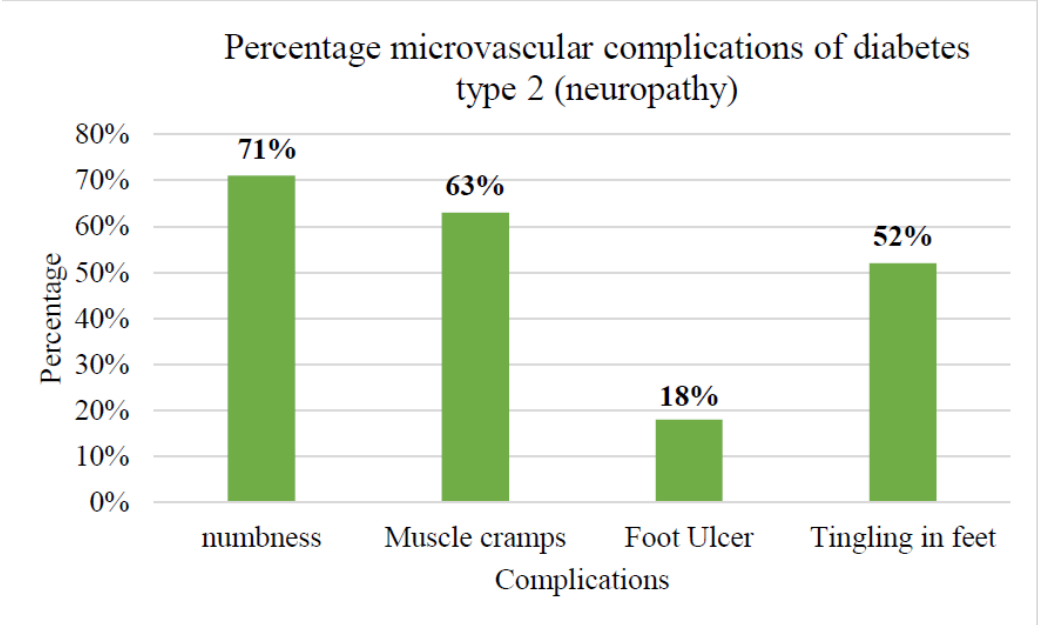

Figure 3: Microvascular complications of diabetes type 2 (Neuropathy)

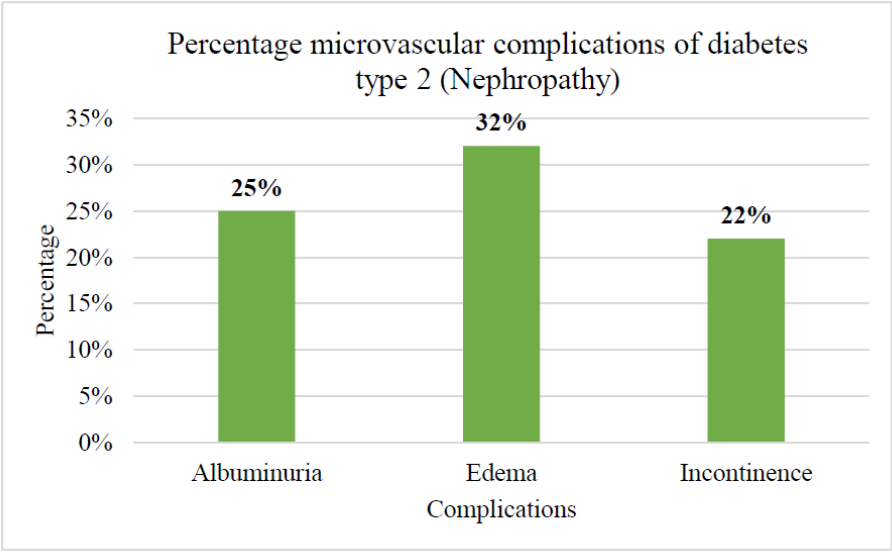

Figure 4: Microvascular complications of diabetes type 2 (Nephropathy)

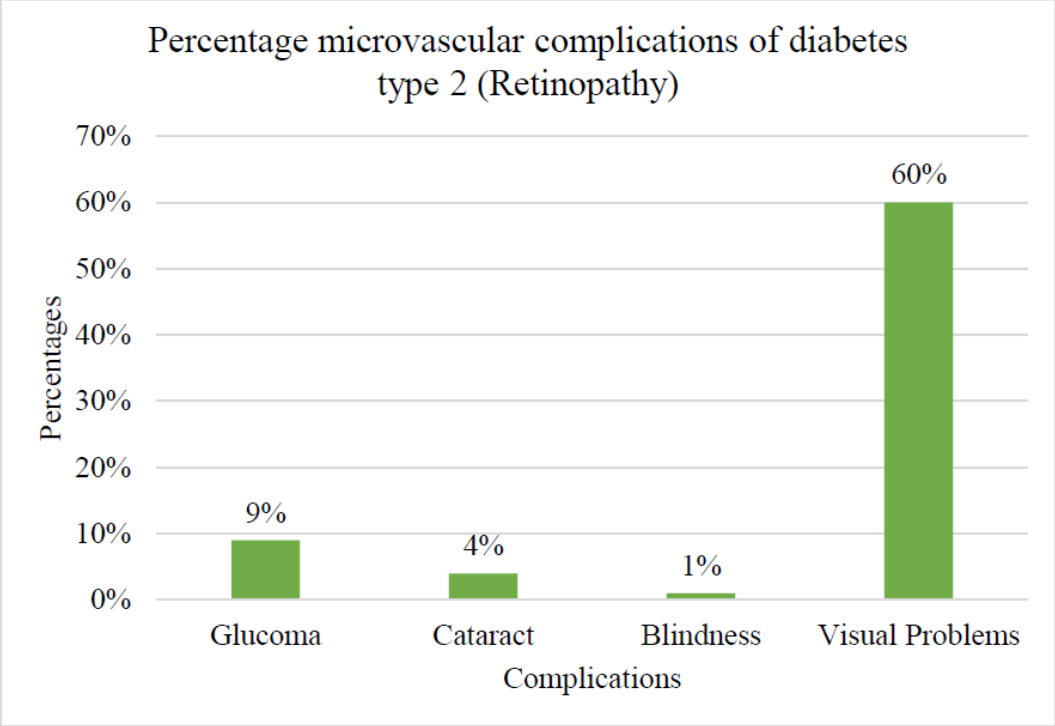

Figure 5: Microvascular complications of diabetes type 2 (Retinopathy)