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Original Research Article

Screening of type 2 diabetes mellitus patients for their macrovascular complications in tertiary care hospital

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ABSTRACT

Background: Type2 diabetes is characterized by a long asymptomatic period commonly to be diagnosed when complications appear. The risk factors associated with diabetes are age, hypertension, dyslipidemia, smoking, alcohol, obesity & others. The role of early detection and adequate treatment of diabetes and related complications patients and health services is the basis for present study.
Methods: The present study was conducted at S.N. Medical College, Agra, India on 86 consecutive newly diagnosed cases of type 2 diabetes. All individuals aged ≥ 20 years of age, who were not known diabetic, presenting to medicine department were included in the study for the targeted and opportunistic screening duration of January 2011 to June 2012.
Results: The prevalence rates of vascular complications in this study group were analyzed statistically. The findings are the mean age was 54.27±9.27 years. 72.09% of newly diagnosed type 2 diabetes patients were aged above 50 years. Maximum number of patients were overweight (37.20%) followed by obese (32.55%). Hypertension was present in 30.23%, prevalence of CAD was 9.30%, and none had evidence of PVD and Cerebrovascular disease.
Conclusions: Macrovascular complications were present in 9.30% of asymptomatic newly diagnosed type 2 diabetes patients. In the study present study found that there was a significant association of these risk factors were identified and treated as early as possible to decrease the progression of vascular complications.

Keywords: Cerebrovascular disease, Coronary artery disease, Peripheral arterial disease, Targeted and opportunistic screening, Type 2 diabetes

INTRODUCTION

The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014. Diabetes prevalence has been rising more rapidly in middle- and low-income countries. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes. Diabetes can be treated, and its consequences avoided or delayed with diet, physical activity, medication and regular screening and treatment for complications.[1]

Type 2 diabetes is characterized by a long asymptomatic period commonly to be diagnosed when complications appear. Indians are susceptible to the major complications

related to diabetes like coronary artery disease, nephropathy, neuropathy and retinopathy. The risk factors associated with diabetes are age, hypertension, dyslipidemia, smoking, alcohol, obesity and others. An effective screening, preventive and treatment strategy is essential to detect risk factor.

A number of studies have been conducted worldwide and few in South India regarding the burden of various complications in newly diagnosed type 2 diabetes patients.[2] Present study is the study of prevalence of vascular complications at diagnosis among newly diagnosed type 2 diabetes patients and their relationship with various associated risk factors. The role of early detection and adequate treatment of diabetes and related complications in reducing the burden for patients and health services is the basis for present study.

METHODS

The targeted and opportunistic screening of Type 2 diabetes mellitus study was carried out at P.G. Department of Medicine, Sarojini Naidu Medical College, Agra, Uttar Pradesh after human ethical clearance. 86 consecutive newly recognized diabetic patients aged ≥20 years had been selected, primarily based on fasting blood glucose ≥126 mg/dl. The patients were screened while attending medicine outdoor and indoor wards by duration of January 2011 to June 2012. They were presented to the hospital either with signs and symptoms of some infection or for routine checkup. Diabetes was detected for the first time and checked with ADA 2010 Criteria for Diagnosis of diabetes pointers.

Inclusion criteria and exclusion criteria

The study was focused on both targeted and opportunistic screening of Type 2 diabetes mellitus study. Informed consent was taken from all the subjects and all participants were evaluated according to protocol. The patients were included in by the following criteria. Individuals' ≥20 years of age willing to participate in study who have their diabetic status unknown or no longer a diabetic. All individuals who have a high risk factor for diabetes as per the protocol of Standards of Medical Care in Diabetes (2008) American Diabetes Association.[2] The exclusion criteria were the individuals of known diabetic, undiagnosed individuals imparting with symptoms and suggestive of diabetes or its complications. Patients on hyperglycemic drugs and of known issues of exocrine pancreas were excluded in this study.

Method of screening

Targeted Screening

A risk assessment questionnaire was provided after screening the individual who were subjected to 8 hours fasting plasma glucose test. The subjects of BMI>25 kg/m 2, physical inactivity, 1st degree relative with diabetes and of >45 years of age, history of CVD, history of IGT/IFG on previous testing, HDL<35 mg/dL and/or triglycerides >250 mg/dL and Clinical condition associated with insulin resistance were targeted for screening.

Opportunistic screening

Patients attending to general medicine department with various symptoms and signs of risk factors for diabetes were subjected to 8 hours fasting plasma glucose test. Individuals with fasting plasma glucose >100 mg/dL but <126 mg/dL were considered to have Impaired Fasting Glucose (IFG) and they were explained about the risk factor for future diabetes.

The subjects fasting blood glucose ≥126 mg/dl or OGTT on a different day for definitive diagnosis were invited for extensive medical examination for the presence or absence of various macro vascular complications diagnosis.[3] And the subjects were evaluated for presence or absence of various complications of macrovascular disorders like Coronary artery disease (CAD), Peripheral arterial disease (PAD), Cerebrovascular disease (CVD) and complications with various risk factors were also performed.[4]

Macrovascular complications

Table 1: Coronary artery disease.

Coronary artery disease (CAD) - standard 12 lead ECG was recorded results were recorded as follows	
Ischemic heart disease (IHD)	ST-T changes on ECG along with typical history of angina or angina equivalents
Myocardial infarction (MI)	Pathological q waves or other ECG changes suggestive of MI
	Past history of myocardial infarction
	Regional wall motion abnormality (RWMA) on echocardiography (if available)
	Normal: A subject with normal ECG and no history suggestive of CAD

Table 2: Peripheral arterial disease.

	Definitive history of intermittent claudication/rest pain
Peripheral arterial disease (PAD):	Absence of peripheral pulses, skin changes (pallor, absence of hair growth, cool and dry skin), presence of gangrene/ulcer or amputation
	ABI (Ankle-brachial index) was calculated in all subjects

Ankle - brachial index (ABI)

Patients were placed in supine position for 5 minutes. SBP was measured in both arms; higher value was taken as denominator for ABI. SBP was measured in dorsalis pedis and posterior tibial artery by placing the cuff just above the ankle, higher value was taken as nominator of ABI in each limb.

The ABI score 0.91-1.30 (normal); 0.7-0.9 (mild obstruction) 0.4-0.69 (moderate obstruction) and <0.40 (severe obstruction). A value of ABI of <0.9 classified the patient as having the complication of PAD. This test is 95% sensitive and 100% specific for angiographically confirmed PAD.[5]

Cerebrovascular disease (CVD)

Positive history of Transient Ischemic Attack (TIA) or stroke in recent or past classified the subject as having the complication of CVD. Assessment for the presence of related risk factors like age of patient, presence of dyslipidemia, history of smoking, history of alcohol intake was done.

Complications with various risk factors

Other risk factors include age, hypertension, obesity and dyslipidemia were studied in the above the targeted and opportunistic screening.

RESULTS

The Table 1 to 10 results indicate the research out put on the screening of type 2 diabetes mellitus patients for their macrovascular complications in tertiary care hospital.

In this study pattern 86 patients were presented to the hospital either with signs and symptoms of some infection or for routine checkup.

Table 3: Results of prevalence of coronary artery disease (CAD) in newly diagnosed asymptomatic diabetic patients.

Coronary artery disease	No. of patients	Prevalence
Myocardial ischemia	6	6.97%
Myocardial infarction	2	2.32%
Total CAD	8	9.30%

Table 4: Results of prevalence of peripheral arterial disease (PAD) in newly diagnosed asymptomatic diabetic patients.

PAD	No. of patients	Prevalence
ABI <0.9(Mild)	0	0%
ABI <0.4(Severe)	0	0%
Overall PAD	0	0%

The results of prevalence of coronary artery disease (CAD) in newly diagnosed asymptomatic diabetic patients the myocardial ischemia (6.97%), myocardial infarction (2.32%) and the total CAD was 9.30%. The result of prevalence of peripheral arterial disease (PAD) and in the people with diabetes was measured with ankle - brachial index (ABI) score and the ABI <0.9 (mild), ABI <0.4 (severe) and overall PAD was not found in this study.

Table 5: Results of prevalence of cerebrovascular disease (CVD) in newly diagnosed asymptomatic diabetic patients.

CVD	No. of patients	Prevalence
History of TIA	0	0%
History of stroke	0	0%
Overall CVD	0	0%

The results of prevalence of cerebrovascular disease (CVD) in newly diagnosed asymptomatic diabetic patients, (Table 5) the history of TIA, stroke and overall CVD were not found in our study.

Table 6: Results of distribution of study population according to age as a risk factor.

Age (years)	Number of patients
20-29	-
30-39	4
40-49	20
50-59	42
60-69	14
70-79	6
80-89	-
Total	86 (100%)

The distribution of study population according to age as a risk factor for the development of vascular complications in the age of 30-39 (4%), 40-49 (20 %), higher in between 50-59 (42%), 60-69 (14 %), 70-79 (6 %) and 80-89 was nil.

Table 7: Results of hypertension as a risk factor.

Hypertension	Study group	Control group	Total	p value
Present	22	4	26	0.0143
Absent	34	26	60	
Total	56	30	86	

The Results of hypertension as a risk factor with vascular complications was 22 patients and were not found in 34 diabetic patients.

Table 8 presents the results of obesity as a risk factor in diabetes patients with vascular complications was 23 and absent in 33 patients.

Table 8: Results of obesity as a risk factor.

Obesity	Study group	Control group	Total	p value
Present	23	5	28	0.0293
Absent	33	25	58	
Total	56	30	68	

The results of dyslipidemia as a risk factor in type 2 diabetes patients with vascular complications was 56% as compared with 30% in patients without vascular complications were seen in Table 9.

Table 9: Results of dyslipidemia as a risk factor.

Dyslipidemia	Study group	Control group	Total	p value
Present	31	9	40	0.04
Absent	25	21	46	
Total	56	30	86	

Table 10 shows the results of prevalence of vascular complications in newly diagnosed asymptomatic diabetic patients the percentage prevalence of microvascular complications was 55.81 and macro vascular was 9.30%, PVD, CVD are none.

Table 10: Results of prevalence of vascular complications in newly diagnosed asymptomatic diabetic patients.

Vascular complications	No. of patients	Prevalence (%)
Total microvascular complications	48	55.81
CAD	8	9.30
PVD	-	-
CVD	-	-
Total macrovascular complications	8	9.30

DISCUSSION

Diabetes mellitus is a chronic metabolic disorder and has a high incidence in India. The greatest challenge for medical profession is not only the management of newly diagnosed uncomplicated diabetes but also various micro- and macrovascular complications associated with increasing duration and poorly controlled diabetes.[6] Hyperglycemia associated with diabetes leads to microvascular and macrovascular disorders, which can be a large cause of morbidity and mortality in diabetic patients. The risk of continual Diabetes disorders increases during continuous hyperglycemias. Many individuals with type 2 diabetes have complications even at the time of diagnosis. Owing to high prevalence of complications in newly diagnosed type 2 diabetes patients and the rising incidence of diabetes in India, the clinician and researcher must develop practical and effective strategies for early detection of disease and to achieve good glycemic control so that morbidity and mortality can be minimized.[7]

This research was on targeted screening and opportunistic screening undertaken to discover the prevalence of diverse macrovascular complications at the time of analysis of type 2 diabetes and their relationship with various threat elements in a consultant population of P.G. Department of Medicine, Sarojini Naidu Medical College, Agra, Uttar Pradesh India. In the screening, 86 consecutive newly identified Type 2 diabetes patients were enrolled from Jan 2011 to Jun 2012.

The American Heart Association has designated DM as a major risk factor for cardiovascular disease was increased in individuals with type 1 or type 2 DM to an extent of two to three fold risk of clinically evident atherosclerosis in patients with type 2 diabetes.[8] The risk of PAD is increased by age, duration of diabetes and the presence of peripheral neuropathy which can affects femoral, popliteal and tibial vessels with an intermittent claudication, rest pain, and if severe, gangrene.[9] In this study the PAD not found may be that number of subjects was less and overall PAD was not found in this study.

CVD tends transient ischemic attack and strokes are more common in people with diabetes and can be three times increased in diabetic patients as compared to general population. Poor glycemic control and nephropathy are associated with increased risk of stroke and also the pathogenesis linked to excessive glycation and oxidation, endothelial dysfunction, increased platelet aggregation, impaired fibrinolysis and insulin resistance and the history of TIA, stroke and overall CVD were not found in this study this is due to number of samples was less.[10]

The distribution of study population according to age as a risk factor for the development of vascular complications was higher in the age group between 50-59, increasing age is associated with increase in prevalence of diabetes and its complications.[11] The national health and nutrition examinations survey (NHANES III) demonstrated that over 65 years old 18-20% have diabetes with 40% having either diabetes or its precursor form of IGT.[12,13] The difference was statistically significant ($p<0.05$) in this study. The hypertension and obesity as risk factor with vascular complications in diabetes patients with vascular complications was significantly associated with prevalence of vascular complications.[14,15] The study results in statistically significant ($p< 0.05$).

Dyslipidemia as a risk factor in type 2 diabetes patients with vascular complications is due to increased triglycerides may prone to develop diabetic complications and in this study the PVD, CVD are none.[16,17] The findings showed that increasing age, hypertension, obesity, dyslipidemia was significantly associated with the occurrence and progression of macrovascular complications.

CONCLUSION

Once diabetes has been diagnosed, other associated risk factors which can increase the occurrence and progression of vascular complications should be looked for. In the study present study found that there was a significant association of these risk factors were identified and treated as early as possible to decrease the progression of vascular complications. However, due to relatively small sample size of this study, further elaborate study in general population is required, not only to substantiate the findings of present study but also to test various screening methods in relation to various risk factors for timely detection of undiagnosed Diabetes cases in our country.

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