

Assessment of Control of Cardiovascular Risk Factors in Type-2 Diabetes

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Conflict of interest: Nil

Abstract

Introduction: Diabetic patients are at increased risk for coronary heart disease and experience increased morbidity and mortality from coronary heart disease compared to their non-diabetic counterparts. The specific factors that can make this expanded hazard include obesity, hyperglycemia, high blood pressure (BP), insulin resistance, and dyslipidemia. When patients are physically inactive or smokers and have at least one cardiometabolic risk factor, this markedly increases the cardiometabolic risk. Also, clustering of these risk factors can markedly increase the risk of cardiovascular disease (CVD). A multifactorial intervention to improve Cardiovascular (CV) hazard factors decreased cardiovascular events and mortality in type 2 DM patients.

Aims and Objectives: This study is intended to assess the CV risk factors in type 2 diabetic patients.

Methods: This is a cross-sectional study in which the diabetic patients were considered and the Glucose, lipid profiles, Blood pressure measurements and Anthropometric variables were determined and the outcome assessment was done. The patients were classified into 2 groups, those who received Oral hypoglycemic agents (OHA group) and those who received Insulin (Insulin group).

Results: 56 % had previous Hypertension .16 % had previous Stroke. 60% patients received Oral hypoglycemic agents (OHA) alone and 40% patients received insulin therapy or both insulin and OHA. Only 10 % patients met the recommended ADA target of HbA1c < 7.0 %. More patients reached the target for FBS than for PLBS (34 % vs. 6%). 54 % of the whole population had BMI < 25 Kg/m², 20 % women had waist circumference < 88 cms and 50 % men < 102 cms.

Conclusion: The poor control of the majority of cardiovascular risk factors in the diabetic subjects, support the need for more aggressive management of modifiable CRF's. It can be achieved only if specialists, primary care physicians and diabetic patients join forces to combat CAD.

Keywords: Hypertension, Oral Hypoglycemic Agents, Cardiovascular Disease, Glucose

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Introduction

Diabetic patients are at increased risk for coronary heart disease and experience increased morbidity and mortality from

coronary heart disease compared to their non-diabetic counterparts [1-2]. It has been reported that patients with Type -2 diabetes

and no previous history of CAD have the same risk for cardiac events as patients with a prior Myocardial infarction [3] due to the association between type-2 diabetes with cardiovascular Risk factors (CRFs) such as dyslipidaemia, Hypertension, obesity, and cigarette smoking [4-9]. The objective of the present study was to assess the degree of control of multiple modifiable CRFs, according to published guidelines in treated Type-2 diabetic patients who live in the city of THANE and attendant at our outpatient department of Medicine at ChatrapatiShivajiMaharaj Hospital and Rajiv Gandhi medical college for routine follow up [10,11].

Subjects and Methods

Study design and Subjects

This is a cross-sectional study in which 50 type-2 consecutive diabetic patients were considered who attended the OPD of medicine department in our hospital between June 2021 and February 2022 for a routine follow up were enrolled in this study. The following variables were extracted from their records: 1) Glycatedhemoglobin (HbA1c) 2) Fasting blood sugar(FBS) 3) post prandial blood sugar(PLBS) 4) Fasting serum High density lipoprotein cholesterol (HDL-C) 5) Low density lipoprotein cholesterol (LDL-C) 6) Fasting serum Triglycerides (TG) 7) Systolic Blood pressure (SBP) 8) Diastolic Blood Pressure (DBP) 9) Body mass Index (BMI) and 10) Waist circumference in Men and Women.

Glucose and lipid profiles

FBS, HbA1c, HDL-C, LDL-C and TG measured after an overnight fast. PLBS was

measured after 2 hours of Lunch. FBS and PLBS by glucose-oxidase method. HbA1c by high performance liquid chromatography. HDL-C and TG estimated by Enzymatic methods and LDL-C was calculated using the equation of Friedwald.

Blood pressure measurements and Anthropometric variables

SBP and DBP measured after 10 minutes rest using a standard brachial cuff technique. BMI calculated as weight divided by square height (Kg/m^2). The WC recorded was the smallest girth between the ribcage and the iliac crest.

Outcome assessment

The American Diabetes Association (ADA) 10 goals were applied for assessment. They are HbA1c < 7.0 %, FBS < 120 mg%, PLBS < 140 %, HDL-C > 40 mg%, LDL-C < 100 mg%, TG < 150 mg%, SBP < 130 mmHg, DBP < 80 mmHg, and BMI < 25 Kg/m^2 .

As recommended by the World Health Organization (WHO) [11], we applied a WC < 88 cms in women and < 102 cms in men as goals of body fat distribution.

Statistical Analysis

The Mean \pm Standard deviation was calculated for all the variables of the Population studied. The control of modifiable CRFs, were expressed as total number and percentage of subjects that achieved the targets were calculated.

Results

The study has determined the baseline characteristics of the patients in OHA group and Insulin group. Baseline characteristics of the study population are presented in Table 1.

Table 1: Characteristics of the study population

	All Pts (n= 50) (Mean \pm SD)	OHA (n=30) (Mean \pm SD)	Insulin (n=20) (Mean \pm SD)
AGE	55 \pm 11.05	51.7 \pm 5.9	52 \pm 7.7
SEX(M/F)	28/22(56/44%)	17/13(56/44%)	12/08(60/40%)
DURATION	5.87 \pm 5.24	3.25 \pm 1.52	8.7 \pm 8.6
BMI	3.15 \pm 3.54	21.8 \pm 1.9	21.47 \pm 1.03

HbA1C	9.02±1.97	7.62±0.8	9.69±1.61
FBS	159±55.65	107±45	216±45
PLBS	251±81.34	168±63	324±117
HDL-C	37.67±8.56	39.71±4.19	35±5.29
LDL-C	115±33.86	122±26.5	136±61
TG	156±50.47	155±53	115±58
SBP	131±15.56	136±17	122±12
DBP	83.64±10.61	90±14	84±5
CAD	06(12%)	03(10%)	03(15%)
HT	28(56%)	15(50%)	13(65%)
STROKE	08(16%)	04(13%)	04(20%)

Characteristics of the study population

50 type –2 diabetic patients were considered. The mean (\pm S.D) age was 55±11.05 years. It was found that 56% of the patients were male while 44% of the patients were female. 12 % had previous CAD. 56 % had previous Hypertension .16 % had previous Stroke. 60% patients received Oral hypoglycemic agents (OHA)alone and 40% patients received insulin therapy or both insulin and OHA.

Insulin users tended to be older, to have longer duration of diabetes and higher prevalence of CAD and HT than subjects taking OHA. These patients had higher HbA1c, FBS, PLBS, and LDL-C levels while lower DBP and HDL-C levels.

Control of modifiable risk factors

The control of modifiable CRFs, expressed as total number and percentage of subjects that achieved the targets are shown in Table 2.

Parameters	All Patients (n=50)	OHA patients (n=30)	Insulin patients (n=20)
HbA1C<7.0%	05 (10%)	03 (10%)	02 (10%)
FBS< 120 mg%	17 (34%)	12 (40%)	05 (25%)
PLBS< 140 mg%	03 (6%)	02 (6.6%)	01 (5%)
HDL-C>40mg%	11 (22%)	07 (23%)	04 (20%)
LDL-C< 100 mg%	14 (28%)	11 (36%)	03 (15%)
TG< 150 mg%	27 (54%)	15 (50%)	12 (60%)
SBP<130 mmHg	31 (62%)	20 (67%)	11 (55%)
DBP< 80 mmHg	30 (60%)	23 (77%)	07 (35%)
BMI< 25 Kg/m ²	27 (54%)	15 (50%)	12 (60%)
Waist Circumference			
WOMEN< 88 cms	10 (20%)	06 (20%)	04 (20%)
MEN< 102 cms	25 (50%)	15 (50%)	10 (50%)

Only 10 % patients met the recommended ADA target of HbA1c < 7.0 %. More patients reached the target for FBS than for PLBS (34 % vs. 6%). The HDL-C target was reached by only 22% of the whole population. In contrast LDL-C target was reached by slightly more subjects i.e., 28 % of the study population. The percentage was lower in patients taking insulin than OHA (36 % vs. 15%). The Triglycerides

goal was achieved by 54 % of the diabetic patients. The percentage was higher in insulin subgroup than those on OHA (60 % vs. 50%). 62 % of the population reached the Systolic BP target while 60 % subjects achieved the Diastolic BP target.

Finally, 54 % of the whole population had BMI < 25 Kg/m², 20 % women had waist circumference < 88 cms and 50 % men < 102 cms.

Discussion

These data indicate the poor control of modifiable cardiovascular risk factors in treated Type-2 diabetic patients. In our study, patients on insulin therapy had longer duration of diabetes. Mortality risk increased with increasing duration – The Hoorn study [12].

The poorer risk factors in our patients being treated with insulin may be the reason for starting insulin. In the present study, the lower mean HbA1c levels obtained in the patients taking OHA could be due to lower PLBS observed in this group. Recently reported that postprandial glucose conc. were better predictors of HbA1c [13,14]. Postprandial hyperglycemia induces endothelial dysfunction & thus has direct atherogenic role independent of lipids [15-17].

Type 2 diabetes is associated with lipid abnormality independent of the level of glycemic control. The UKPDS has shown that decrease HDL-C and increased LDL-C predicted CAD16. In our study only 22 % patients reached the HDL-C target and 28 % patients reached the LDL-C target. Cholesterol-lowering therapy is beneficial for people with DM even if they do not already manifest CAD or high cholesterol conc.- The heart protection study. Gemfibrozil, a fibrate, was associated with a 24 % decrease in cardiovascular events in diabetic subjects with prior CAD17. Fenofibrate may be better choice in combined hyperlipidemia [18-20]. The results of ongoing Fenofibrat Interventional and Event Lowering in Diabetes (FIELD) trial is awaited.

In the present study 62 % of the subjects met the SBP goal. Isolated systolic hypertension is a major risk factor for CAD in diabetic patients [21] and a decrease in SBP of 10 mm Hg was associated with decrease in myocardial infarction of 11% [22]. ACE inhibitors and ARB reduces the cardiovascular death and incidence of cardiovascular events in diabetic patients

[23]. Waist Circumference (WC) has been commonly accepted as the anthropometric standard of abdominal obesity due to its simplicity [24]. Wilson et al demonstrated that the effect of overweight and obesity as determinants of cardiovascular risk factor was similar [25].

The low number of diabetic patients who achieved a BMI < 25 Kg/m² and low percentage of female pts, who obtained WC < 88 cms in our study raises concern as there is clear relationship between BMI [26] or abdominal obesity [27] and cardiovascular disease. In the above study, none of the patients had optimal control of all modifiable CRF's. Lack of adherence to medical therapy, education about the diabetes mellitus and its complications, lack of knowledge about the importance of diet and exercise could be the reasons for failure to achieve all the goals [25].

Coexisting diabetes, hypertension, dyslipidaemia and CAD in the same patient may require a patient to take 7 to 9 separate medications each day. This puts economic burden on the low income group of patients who attend our OPD at CSMH, thus affecting the drug compliance [24,26].

Conclusion

The poor control of the majority of cardiovascular risk factors in the diabetic subjects, support the need for more aggressive management of modifiable CRF's. To achieve the goals recommended by the accepted guidelines, the combination of cost-effective pharmacotherapy, outpatient education programs about the knowledge of disease, dietary therapy, exercise and CRF's modification needs to be provided. These cannot be used effectively unless specialists, primary care physicians and diabetic patients join forces to combat CAD.

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