www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 83.27
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v5i4.216

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

**Original Article**

# Study of Cardiovascular Risk Factors in Patients of Diabetes type 2 with Special Reference to Sex Differences

Authors
**Gosai. Kanugir. R.[1], Gosai. Jigarkumar. B.[2]**
[1]Assistant Professor, Department of Medicine, GMERS Medical College, Gotri, Vadodara
[2]Assistant Professor, Department of Emergency Medicine, B.J. Medical College, Ahmedabad
Corresponding Author
**Dr Kanugir. R. Gosai**
Address: 101, Mithila – 2, Opp: Tatanagar, New Mental Campus, Meghaninagar, Ahmedabad, 380016
Contact No: 9924209959, 9924209954, Email: *drdharagosai@yahoo.co.in*

**Abstract**
**Objective:** *To assess the sex differences in the prevalence of cardiovascular risk factors among patients with type 2 diabetes attended at tertiary care centre.*
**Material & Methods:** *A cross-sectional study was performed among the type2 diabetes patients attending a tertiary care centre .We collected all data on preformed proforma regarding various risk factors for cardiovascular diseases in form of BMI, hypertension, dyslipidemia, smoking, alcohol consumption and glycemic control (HbA1c >8% considered poor control) with prior informed consent. Data was analysed using SPSS, version 16.0.*
**Results:** *Risk factors among 100 patients (80% males; mean age 54 years) patients were obesity (84%), poor glycemic control (32%), hypertension (34%), dyslipidemia (20%), smoking (61%) and consumption of alcohol (52%), respectively. Women had a higher prevalence of poor glycemiccontrol (40% vs 30%) and dyslipidemia (30% vs 17.5%) while men had a higher prevalence of smoking (75%) and alcohol consumption (65%). There were no sex differences in prevalence of hypertension and obesity.*
**Conclusion:** *Cardiovascular risk factors were highly prevalent among patients with type 2 diabetes attending a tertiary care centre in India, with different risk profiles among men and women. We recommend a specific approach as per prevalence of sex specific risk factors in planning interventions to reduce the risk of cardiovascular disease*
**Keywords:** *sex differences, cardiovascular risk factors, type 2 diabetes.*

## Introduction

The burden of diabetes mellitus (DM) and cardiovascular disease (CVD) is on the rise in all developing countries. India has the highest number of people living with DM[1,2] and the risk of developing CVD is 2–4 times higher among people with diabetes as compared to people without diabetes.[3]Mortality due to CVD account for 65–75% of all deaths among diabetes patients.[4] There is evidence that South Asians have a high prevalence of CVD risk factors and are more susceptible to CVD.[5,6]

Globally, several studies have examined gender-based differences in the distribution of cardiovascular risk factors and risk of CVD among patients with diabetes, which indicate excess risk factor clustering among females, thus rendering them at an increased risk of CVD and CVD mortality as compared to men.[7–9] These studies were conducted in varied settings and ethnic groups, outside India. There is limited information from India about the prevalence of CVD risk factors in patients on long-term diabetes care in specialized tertiary care hospital settings.

A recent study from Orissa, India, describes the prevalence of CVD risk factors among type 2 DM patients attending a tertiary care centre. But it did not provide any information, disaggregated by sex and was limited by small sample size.[10]In this cross-sectional study, we report on the sex differences in the prevalence of cardiovascular risk factors in a large cohort of DM patients attending a tertiary

**Material &Methods**

This was a cross sectional study involving DM patients attending outpatient care department at tertiary care hospital of Gujarat. Total 100 DM patients whose age were> 18 years of age have been enrolled in this study during period of 6 months from June 2014 to December 2014. Patients whose age was <18 years, pregnant & lactating women were excluded from this study. After obtaining written informed consent a structured questionnaire was used to collect information on sex, age, residence, duration of diabetes, family history of diabetes, education status, current medication for diabetes (diet only, oral medication only, insulin only, oral plus insulin), personal habits such as current smoking (defined as a history of smoking in the last 3 years) and alcohol consumption (defined as consumption of average daily consumption of 60 ml of alcohol).

Occupation was classified as skilled (carpenter, painter, electrician, plumber, etc.) and unskilled (farmer, labourer), businessmen, and 'others' for categories such as retired people, homemakers, and unemployed. Anthropometric measurements, including height and weight were measured for calculation of body mass index (BMI). Obesity was defined as BMI ≥25kg/m2.[11]

Biochemical parameters such as fasting and postprandial glucose levels and glycosylated haemoglobin (HbA1c) levels were recorded. Patients were assessed for poor glycemic control (HbA1c >8%) and presence of other comorbidities such as hypertension and dyslipidaemia. Hypertension was defined as history of hypertension and receiving anti-hypertensive drugs or systolic blood pressure≥140 mmHg and/ or diastolic blood pressure ≥90 mmHg.[12]

Dyslipidaemia was defined as history of receiving any lipidlowering drug or the presence of any one lipid abnormality, i.e., total cholesterol≥ 5.18 mmol/L (200 mg/dl) or triglycerides ≥1.69 mmol/L(150 mg/dl) or LDL cholesterol ≥2.59 mmol/L (100 mg/dl) or HDLcholesterol <1.04 mmol/L (40 mg/dl) in men and <1.3 mmol/L (50 mg/dl) in women.[13]

Data was analysed using SPSS, version 16.0. Differences between men and women were assessed for statistical significance using the two-tailed t-test and Chi-square test, as appropriate. A p value of <0.05 was considered as statistically significant. Ethical approval was given by institutional ethics committee.

**Results**

Total of 100 patients with type 2 DM who attended the outpatient care department of the hospital during the study period were enrolled in this study.

**Table :1** Socio demographical Profile of Study Population

| Characteristics | Men | Women | P Value | Total |
|---|---|---|---|---|
| Total | 80 | 20 | | 100 |
| Mean Age(Years) | 47 | 40 | | |
| Location | | | 0.027 | |
| Urben | 34(42.5) | 14(70) | | 48 |
| Rural | 46(57.5) | 6(30) | | 52 |
| Education Status | | | 0.001 | |
| Non Schooling | 2(2.5) | 6(30) | | 8 |
| Primary | 26(32.5) | 0 | | 26 |
| Secondary | 2(2.5) | 2(10) | | 4 |
| Higher Secondary | 44(55) | 12(60) | | 56 |
| Graduate | 6(7.5) | 0 | | 6 |
| Family History Of Dm | 64 | 9 | | 73 |
| Occupation | | | 0.0001 | |
| Skilled | 2(2.5) | 0 | | 2 |
| Unskilled | 74(92.5) | 10(50) | | 84 |
| Study | 4(5) | 4(20) | | 8 |
| Housewife | 0 | 6(30) | | 6 |
| Economic Status | | | 0.5320 | |
| Low | 30(37.5) | 6(30) | | 36 |
| Middle | 50(62.5) | 14(70) | | 64 |
| High | 0 | 0 | | 0 |

Out of them, 80% were males and mean (SD) age was 47 (11.3) years. The socio-demographic factors and clinical details of the patients, disaggregated by sex, are shown in Table 1. Mean age was similar in both men and women. Majority of women were from urban location as compared to men (70% vs 42.5%).73% patients had a positive family history of diabetes. Approximately 34% of the subjects were on a combination of oral hypoglycemic drugs and insulin therapy.

Sex-wise clinical characteristics and other CVD risk factors are described in Table 2. The mean duration of DM care was about 5.9 years and was similar among both sexes.(P value-0.9) The most prevalent CVD risk factor was obesity (84%) with same prevalence among women as compared to men (80 vs 85%), followed by Smoking (61%), consumption of alcohol (52%), hypertension (34%) uncontrolled glycemic status (32%), and dyslipidaemia (20%).

Smoking (75%) and consumption of alcohol (65%) was highly prevalent in men, while almost low in women. While other risk factors like hypertension (50%) & dyslipidemia (30%) were higher found in women. Women had significantly higher mean HbA1c levels as compared to men.

**Table 2:** Cardiovascular Risk Factors of Type 2 Diabetes Patients

| Characteristics | Men | Women | P Value | Total |
|---|---|---|---|---|
| Total | 80 | 20 | | 100 |
| Duration Of Dm(Years) | | | 0.9575 | |
| <1 | 40(50) | 10(50) | | 50 |
| 1-2 | 14(17.5) | 4(20) | | 18 |
| >2 | 26(32.5) | 6(30) | | 32 |
| Bmi(Kg/M2) | | | 0.3041 | |
| <18 | 0 | 0 | | 0 |
| 18-23 | 4(5) | 0 | | 4 |
| 23.1-24.9 | 8(10) | 4(20) | | 12 |
| >25 | 68(85) | 16(80) | | 84 |
| Hba1c% | | | 0.3912 | |
| <7 | 0 | 0 | | 0 |
| 7-8 | 56(70) | 12(60) | | 68 |
| 8.1-9 | 24(30) | 8(40) | | 32 |
| >9 | 0 | 0 | | 0 |
| Other Risk Factors | | | 0.0059 | |
| Smoking | 60(75) | 1(10) | | 61 |
| Alcohol Consumption | 52(65) | 0(0) | | 52 |
| Dyslipidaemia | 14(17.5) | 6(30) | | 20 |
| Hypertension | 24(30) | 10(50) | | 34 |

**Discussion**

Our study revealed that a large proportion of people with type 2 diabetes attending a tertiary care centre had CVD risk factors despite receiving standard diabetes care for a long duration. There was a gender-wise difference noted in the cardiovascular risk profile with obesity, hypertension; dysliidemia and HbA1c levels being higher in women while smoking and alcohol consumption being higher men.

Obesity, particularly central obesity, has been shown in other studies to be an independent risk factor for cardiovascular diseases, even in the absence of diabetes.[14] The observed high rate of obesity, particularly among women, may be due to their sedentary lifestyle and lack of physical activity. It is a limitation of our study that we could not systematically document the level of physical activity, diet intake and waist circumference for central obesity.

Mean HbA1c levels were significantly higher in women as compared to men. Good glycemic control remains a vital component of preventing CVD. Poor glycaemic control could be a reason for our patients with diabetes requiring combination therapy. But, in the absence of information on other factors that are responsible for poor glycaemic control such as compliance with diet, physical exercise, inter current illness and ingestion of other drugs, it would be inappropriate to speculate on the reasons of this finding. This, however implies the need for more sustained intervention to reduce the risk of prolonged metabolic disturbance.

It is expected that individuals of Indian ethnicity will account for between 40–60% of global CVD burden within the next 10–15 years.[15]Several studies report that CVD risk factors vary substantially between sexes[8,9] and the CVD risk was considerably higher in women than in men in a 10-year follow-up study.[7] These data necessitate aggressive treatment of CVD risk factors in women with type 2 diabetes.

Similar results were observed in a recently published cross-sectional study conducted by Joni et al in South Carolina USA. The authors reported that women with type 2 diabetes had significantly lower composite control of CVD risk factors (i.e.,HbA1c, blood pressure, and LDL cholesterol levels were not under control) compared with men with type 2 diabetes.[19]Another study reported a high prevalence of CVD and risk factors for CVD in Iranian patients with diabetes that underscores the importance of better detection and treatment of metabolic risk factors of CVD in those patients.[16]

All the DM patients attending the tertiary care centre were routinely offered counselling services on lifestyle modifications, specific education and advice. But the study findings revealed high prevalence of CVD risk factors irrespective of duration of DM. This could probably indicate that the current efforts taken to educate patients are not sufficient and innovative interventions are required to effect lifestyle changes.

Moreover, men had a higher prevalence of smoking and alcohol consumption. So, there is a need to provide individualized, systematic and comprehensive care and effective counselling to effect behavioral change. The approach also needs to gender-sensitive, given distinct risk factor clustering between the sexes.

**Conclusion**

Cardiovascular risk factors are highly prevalent among patients with type 2 diabetes attending a tertiary care centre in South India. There is a distinct gender-based risk clustering with higher levels of obesity, poor glycemic control, hypertension and dyslipidemia & lower levels of smoking and alcohol consumption among women.

Gender-based approach to manage DM patients for preventing the risk of future CVD, innovative means of counselling to effect behavioural change, including support to quit smoking and alcohol consumption and more aggressive management of glycemic control and comorbi-dities such as dyslipidaemia and hypertension are essential.

**References**


1. Boutayeb A, BoutayebS. The burden of non communicable diseases in developing countries. Int J Equity Health2005; 4:2.
2. International Diabetes Federation. IDF Diabetes Atlas. 5th ed, 2012 Update. Unwin N, Whiting D, Guariguata L, et al., eds. Brussels, Belgium: International Diabetes Federation, 2012.http://www.eat-las.idf.org/diabetesatlas/5e/update 2012. Accessed November 15, 2013.
3. Kannel WB, McGee DL. Diabetes and cardiovascular disease.The Framingham study. JAMA1979; 241:2035–8.
4. Moss SE, Klein R, Klein BE. Cause-specificmortality in a population-based study of diabetes. Am J Public Health1991; 81:1158–62.
5. Ramachandran A, Snehalatha C, LathaE, Satyavani K, Vijay V. Clustering of cardiovascular risk factors in urban Asian Indians. Diabetes Care1998; 21:967–71.
6. Joshi P, Islam S, Pais P, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. JAMA2007; 297:286–94.
7. Becker A, Bos G, deVegt F, etal.Cardiovascular events in type 2 diabetes: comparison with nondiabetic individuals without and with prior cardiovascular disease: 10-year follow-up of the Hoorn Study. Eur Heart J2003; 24:1406–13.
8. Castanho VS, Oliveira LS, Pinheiro HP, et al. Sex differences in risk factors for coronary heart disease: a study in Brazilian population. BMC Public Health,2001; 1:3.
9. Jousilahti P, Vartiainen E, TuomilehtoJ, Puska P. Sex, age, cardiovascular risk factors, and coronary heart disease. A prospective follow-up study of 14786 middle-aged men and women in Finland. Circulation1999; 99:1165–72.
10. Patnaik L, Pattnaik S, Ghosh T, Sahoo AK, Sahu T. Coronary heart disease risk factors among diabetic patients attending a tertiary care hospital – a cross sectional study. Internet J Epidemiol2013; No.1.
11. Misra A, Chowbey P, Makkar BM, et al., for Consensus Group. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. J Assoc Physicians India2009; 57:163–70.
12. Chalmers J, MacMahon S, Mancia G, et al. 1999 World Health Organization – International Society of Hypertension Guidelines for the management of hypertension. Guidelines sub-committee of the World Health Organization.ClinExp Hypertens1999; 21:1009–60.
13. United States Department of Veteran Affairs.VA/DoD Clinical Practice Guidelines.Management of Dyslipidemia (LIPIDS) (2006).Available at:http://www.healthquality.va.gov/dyslipidemia_lipids.asp.Accessed on December 3, 2013.
14. deKoning L, Merchant AT, Pogue J, Anand SS. Waist circumference and waist-to-hip ratio as predictors of cardiovascular events: meta-regression analysis of prospective studies. Eur Heart J 2007; 28:850–6.
15. Gaziano TA, Reddy KS, Paccaud F, Horton S, Chaturvedi V. Cardiovascular disease. In: Jamison DT, Breman JG, Measham AR, et al. eds. Disease control priorities in developing countries. New York: Oxford University Press, 2006: 645–62.
16. Bonakdaran S, Ebrahimzadeh S, Noghabi SH. Cardiovascular disease and risk factors in patients with type 2 diabetes mellitus in Mashhad, Islamic Republic of Iran. East Mediterr Health J2011; 17:640–6.

17. Kempler P. Learning from large cardiovascular clinical trials: classical cardiovascular risk factors. Diabetes Res Clin Pract2005; 68(Suppl. 1):S43–7.
18. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; for the STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet2007; 370:1453–7.
19. Strom Williams Joni L, Lynch Cheryl P, Winchester Rhonda, Thomas Leslie, Keith Brad, EgedeLeonard E. Gender differences in composite control of cardiovascular risk factors among patients with type 2 diabetes. Diabetes Technology and Therapeutics2014; 16:421-427.