



GLYCEMIC STATUS AND SHORT TERM OUTCOME IN PATIENTS WITH DIABETES MELLITUS ADMITTED WITH ACUTE MACROVASCULAR COMPLICATION IN A TERTIARY CARE HOSPITAL IN INDIA

General Medicine

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ABSTRACT

Introduction: Diabetes is a global endemic with rapidly increasing prevalence in both developing and developed countries. Over the past two decades the prevalence of diabetes has risen from an estimated 30 million cases in 1985 to 415 million in 2017.

Aims & objectives: To study HbA1c and other biochemical & clinical parameters of acute ischemic cerebrovascular accident, acute coronary syndrome and acute limb ischemia in diabetic patients.

Specific objectives:

- To estimate 72 hrs mortality in hospitalized patient with diabetes mellitus with acute ischemic cerebrovascular accident.
- To estimate 72 hrs mortality in hospitalized patient with diabetes mellitus with acute coronary syndrome
- To estimate 72 hrs mortality in hospitalized patient with diabetes mellitus with acute limb ischemia
- To study correlation between HbA1C and 72 hours mortality of patients with acute macrovascular events among diabetics.

Materials & methods: Department of general medicine, R.G.Kar Medical College and Hospital. Cases were selected from medicine inpatients department of R.G.Kar Medical College and Hospital. 1st July, 2018-30th June 2019. This is an observational prospective study

Conclusion: In our study we found that higher HbA1C is associated with statistically significant increase in 72 hour mortality in patients with acute ischemic stroke and trend of increased mortality (though not statistically significant) in patients ($p=0.0002$ & 0.056 respectively)

KEYWORDS

INTRODUCTION

Diabetes is a global endemic with rapidly increasing prevalence in both developing and developed countries. Over the past two decades the prevalence of diabetes has risen from an estimated 30 million cases in 1985 to 415 million in 2017. Based on current trends, the IDF projects that 642 million individuals will have diabetes by the year 2040.¹ Although the prevalence of both type 1 and type 2 DM is increasing worldwide, the prevalence of type 2 DM is rising much more rapidly, presumably because of increasing obesity, reduced activity levels as countries become more industrialized, and the aging of the population. In 2015 around 73 million Indians suffer from diabetes mellitus.¹

The prevalence of diabetes peaks at 45–55 years of age in Indians, nearly a decade earlier as compared to the Western population, with a progressive decline beyond 65 years of age. Contrary to the Western world, the prevalence is higher in men as compared to women. Increased visceral fat (central obesity), greater consumption of carbohydrate-rich diet, and high prevalence of sedentary lifestyle predispose Indian population to diabetes.² That the risk of macrovascular disease starts much earlier before the onset of overt diabetes, and this was demonstrated in the San Antonio Heart Study.² The concurrent presence of multiple risk factors like obesity, insulin resistance/hyperinsulinemia, dyslipidemia, and hypertension in individuals with prediabetes results in increased risk for cardiovascular disease and future onset of diabetes.

The risk factors for macrovascular complications in diabetes are age, poor glycemic control, hypertension, dyslipidemia, proteinuria, and smoking.

AIMS & OBJECTIVES

GENERAL OBJECTIVES:

To study HbA1c and other biochemical & clinical parameters of acute ischemic cerebrovascular accident, acute coronary syndrome and acute limb ischemia in diabetic patients.

SPECIFIC OBJECTIVES:

- To estimate 72 hrs mortality in hospitalized patient with diabetes mellitus with acute ischemic cerebrovascular accident.

- To estimate 72 hrs mortality in hospitalized patient with diabetes mellitus with acute coronary syndrome
- To estimate 72 hrs mortality in hospitalized patient with diabetes mellitus with acute limb ischemia
- To study correlation between HbA1C and 72 hours mortality of patients with acute macrovascular events among diabetics.

MATERIALS & METHODS

STUDY AREA: Department of general medicine, R.G.Kar Medical College and Hospital

STUDY POPULATION:

- Cases of acute ischemic cerebrovascular accident diagnosed clinically and/or radiologically (non contrast CT and/or DWI-MR imaging).
- Cases of acute coronary syndrome diagnosed clinically and 12 lead ECG and/or with biomarkers (troponin T qualitative assay kit) and/or imaging (Echocardiography).
- Cases of acute limb ischemia diagnosed clinically and/or radiologically [Doppler study of arterial system of limb(s)]

Cases were selected from medicine inpatients department of R.G.Kar Medical College and Hospital

STUDY PERIOD:

1st July, 2018-30th June 2019

STUDY DESIGN:

This is an observational prospective study

INCLUSION & EXCLUSION CRITERIA:

Known diabetic patients > 50 years of age with acute coronary syndrome, acute ischemic cerebrovascular accident, acute limb ischemia from the medicine indoor of R.G.K.M.C&H will be taken for the study.

Patients with delayed presentation (>48 hours after onset of symptoms), significant hematological abnormality (WBC count $<4 \times 10^9/L$ or $>11 \times 10^9/L$), infectious disease, severe liver and/or renal insufficiency (known cases of chronic liver disease of Child-Pugh

class C and chronic kidney disease stage 3 or higher) are excluded from the present study.

STUDY VARIABLES:

AGE: measured in years.

GENDER: male or female

STUDY TOOLS:

1. Consent form
2. Case record form
3. Diagnosis of new cases
4. Pretested and predesigned proforma
5. Investigations as mentioned above

STATISTICAL ANALYSIS:

At the end of the study the data was compiled, tabulated and analyzed with appropriate standard statistical method using SPSSv22. Parametric test eg. t test, was applied to see the statistical significance of the difference in mean and Non Parametric test eg. Chi square test, was applied for proportion.

RESULT & DISCUSSION

During one year period 48 patients with acute ischemic stroke, 51 patients of acute coronary syndrome and 0 patients of acute limb ischemia were studied. At the end of the study 16 patients died in the ischemic stroke group and 19 patients in the ACS group.

Higher mortality among subjects in this study is probably multifactorial. It may be due to selection of high risk patients (diabetics and older patients) or due to different management protocol. But such a comparison is unjust as patients in a tertiary care setting are highly selected.

Average age among the patients with ischemic stroke was 69.16 ± 10.18 years and in ACS group was 69.94 ± 10.27 years. Mean age of the alive patients in ischemic stroke group and ACS group were 65.81 ± 9.84 years and 66.63 ± 9.25 years respectively and of that of dead patients were 75.88 ± 7.24 years and 75.53 ± 9.65 years respectively. Unpaired t test demonstrated significant difference between the alive & dead patients. In the ischemic stroke group there is a difference of mean age between dead & alive of 10.06 years (95% CI 4.46 -15.66 years; $p=0.0007$) and in the ACS group 8.9 years (95 % CI 3.42-14.38 years; $p=0.002$).

A study by Christopher J Weir et al showed age as a poor prognostic factor among non diabetic subjects (relative hazard 1.36 per decade; 95% confidence interval 1.21 to 1.53).³ A study by Asplund et al also demonstrated similar result for 30 day case fatality (case fatality rate was 25% in patients ≥ 85 years and 12% in patients < 85 years ($p < 0.01$)).⁴

In the ischemic stroke group out of total 48 patients 25 were male and 23 were female. After 72 hours 17 of the 25 males were alive (68%) and 8 were dead (32%) and 15 of the 23 females were alive (65.22 %) and 8 were dead (34.78 %). Chi square test among alive and dead demonstrated no statistical significance ($p=0.83$)

In the ACS group out of total 51 patients 28 were male and 23 were female. After 72 hours 19 of the 28 males were alive (67.86%) and 9 were dead (32.14%) and 13 of the 23 females were alive (56.52 %) and 10 were dead (43.48 %). Though mortality was slightly higher among chi square test among alive and dead demonstrated no statistical significance ($p=0.40$)

Granger et al also did not found any correlation between gender and mortality in ACS patients.⁵

Among the ischemic stroke patients mean NIHSS Score on admission was 15.58 ± 11.47 . Mean NIHSS among the alive patients was 10.06 and that of dead patients was 26.63. Unpaired t test demonstrated difference in Means is significant ($p<0.0001$; 95 % CI 11.37-21.75). In the study higher NIHSS Score on admission correlates with poor outcome at 72 hours.

Mean of HbA1C among the admitted patients with ischemic stroke was 7.27 ± 0.82 . Mean HbA1C among the alive patients was 6.97 and that of dead patients was 7.88. Unpaired t test demonstrated difference in Means is significant ($p=0.0002$; 95 % CI 0.46-1.34). Among the ischemic stroke patients mean CBG on admission was 242.77 ± 91.89

mg/dl. Mean CBG among the alive patients was 202.5 and that of dead patients was 323.3. Unpaired t test demonstrated difference in Means is significant ($p<0.0001$; 95 % CI 76.18-165.4). In the study higher CBG on admission correlates with poor outcome at 72 hours.

Christopher J Weir et al³ also in their study showed increased mortality among patients with initial hyperglycemia on admission (>8 mmol/litre) as poor prognostic factor.

Mean of HbA1C among the admitted patients with ACS was 7.13 ± 0.73 . Mean HbA1C among the alive patients was 6.99 and that of dead patients was 7.39. Unpaired t test demonstrated difference in Means is not significant ($p=0.056$; 95 % CI -0.01-0.82).

Mean of CBG on admission among the admitted patients with ACS was 199.47 ± 69.78 mg/dl.

Mean CBG among the alive patients was 170.8 mg/dl and that of dead patients was 247.8 mg/dl. Unpaired t test demonstrated difference in Means is significant ($p<0.0001$; 95 % CI 42.55- 111.6 mg/dl).

A study by Abbas Ali Mansour et al among patients with ACS found that on admission hyperglycemia though associated with increased heart failure is not associated with increased mortality.⁶ Our study result here does not match with their study regarding on admission hyperglycemia.

Mean of serum triglyceride on admission among the admitted patients with ischemic stroke & ACS was 205.89 ± 76.54 & 163.23 ± 55.46 mg/dl respectively. Mean triglyceride among the alive patients was 194.8 & 163.23 mg/dl and that of dead patients was 228.0 & 171.7 mg/dl respectively. Unpaired t test demonstrated no statistical significance ($p=0.16$ & 0.40 respectively).

Mean of serum non-HDL cholesterol on admission among the admitted patients with ischemic stroke & ACS was 168.87 ± 38.47 & 153.29 ± 24.89 mg/dl respectively. Mean non HDL-C among the alive patients was 159.5 & 153.29 mg/dl and that of dead patients was 180.7 & 161.3 mg/dl respectively. Unpaired t test demonstrated no statistical significance ($p=0.07$ & 0.07 respectively)

Studies regarding correlation of base line lipid profile and short term outcome of acute macrovascular event is scarce.

Chi square analysis of systolic blood pressure in our study reveals significant correlation with mortality with category D (systolic BP <90 mm of Hg) having highest mortality and category A (systolic BP 90-139 mm of Hg) having lowest mortality in both ischemic stroke and ACS group ($p=0.002$ and 0.0001 respectively)

Results of these study correlates well with our study.

On the other hand a study by A M Boreas et al concluded that there is no significant correlation between admission BP and mortality in ischemic stroke.⁷

In our study we categorized heart failure as A, B, C & D corresponding Killip class I, II, III & IV respectively. Chi square analysis reveals increased mortality with higher category of heart failure (higher killip class) { $p<0.0001$ } among ACS patients. Chi square analysis also reveals increased mortality among Troponin T positive patients ($p=0.045$).

A study by Granger; Robert J. Goldberg; Omar Dabbous et al concluded that age (odds ratio [OR], 1.7 per 10 years), Killip class (OR, 2.0 per class), systolic blood pressure (OR, 1.4 per 20-mm Hg decrease), ST-segment deviation (OR, 2.4), cardiac arrest during presentation (OR, 4.3), serum creatinine level (OR, 1.2 per 1-mg/dL [88.4- μ mol/L] increase), positive initial cardiac enzyme findings (OR, 1.6), and heart rate (OR, 1.3 per 30-beat/min increase) were associated with increased mortality.⁸ Finding of their study corroborates with our findings.

SUMMARY AND CONCLUSION

From the finding of the study we can assume that HbA1C and blood glucose level on admission is a good predictor of in-hospital death after an acute macrovascular event. We also found that increased capillary blood glucose on admission was associated with increased mortality in

both acute ischemic stroke and ACS which were statistically significant.

Increased age was associated with poor outcome in both groups. Systolic BP on admission was also showed correlation with mortality in both groups. Patients who presented with shock (systolic BP <90 mm of Hg) had the poorest outcome and those who had systolic BP between 90-139 mm of Hg had the best outcome in both groups.

Among other parameters initial higher NIHSS Score and presence of atrial fibrillation on admission was associated with poor outcome in ischemic stroke and Troponin T positivity & higher categories of heart failure (corresponding higher Killip class) was associated with poor outcome in patients with ACS.

Larger studies with controls are to be conducted for further corroboration of our study findings.

REFERENCES

1. Harrison's Principles of Internal Medicine, 20th Edition, 2018, McGraw-Hill Education
2. Clinical Rounds in Endocrinology, Anil Bhansali, Yashpal Gogate, 2015, Springer
3. Is hyperglycaemia an independent predictor of poor outcome after acute stroke? Results of a long term follow up study; by Christopher J Weir, Gordon D Murray, Alexander G Dyker, Kennedy R Lees; BMJ 1997;314:1303
4. Stroke in the Elderly, Observations in a Population-Based Sample of Hospitalized Patients, Asplund K. • Carlberg B. • Sundström G. Cerebrovasc Dis 1992;2:152–157
5. Granger CB, Goldberg RJ, Dabbous O, et al. Predictors of Hospital Mortality in the Global Registry of Acute Coronary Events. Arch Intern Med. 2003;163(19):2345–2353.
6. Acute Phase Hyperglycemia among Patients Hospitalized with Acute Coronary Syndrome: Prevalence and Prognostic Significance, Abbas Ali Mansour, and Hameed Laftah Wanoose, Oman medical journal, 2011 Mar; 26(2): 85–90. PMCID: PMC3191683
7. High-density lipoprotein, but not low-density lipoprotein cholesterol levels influence short-term prognosis after acute coronary syndrome: results from the MIRACL trial, A M Boreas, J Lodder, F Kessels, P W de Leeuw & J Troost, European Heart Journal, Volume 26, Issue 9, May 2005, Pages 890–896
8. Granger CB, Goldberg RJ, Dabbous O, et al. Predictors of Hospital Mortality in the Global Registry of Acute Coronary Events. Arch Intern Med. 2003;163(19):2345–2353.