Correlation Of Hba1c With Lipid Profile In Patients Of Ischemic Stroke Or TIA

Sahil Kumar[1], Sukhminder Singh[2], Gurinder Kaur[3], Ravneet Kaur[4], Anshul Bhateja[5], Aprajita Sharma[6]

[1]Senior resident, Department of Medicine, GMC Amritsar, Punjab, India;
[2]Senior resident, Department of Medicine, GMC Amritsar, Punjab, India
[3]Senior resident, Department of Ophthalmology, GMC Amritsar, Punjab, India;
[4]MBBS, GMC Amritsar, Punjab, India;
[5]Senior resident, Department of Medicine, GMC Amritsar, Punjab, India;
[6]Junior resident, Department of Anaesthesia, IGMC Shimla, Himachal Pradesh, India

[2]Email: sukhisunny@gmail.com

ABSTRACT
Background: Stroke is the second leading cause of death in the world in the last two decades. The present study was conducted to evaluate correlation of HbA1C with lipid profile in patients of ischemic stroke or TIA.
Materials & Methods: 50 patients of acute ischemic stroke or TIA, were assessed for glycosylated blood glucose and lipid profile level.
Results: There were 10 patients in age group of <50years, 6 patients in age group of 50-60 years, 16 patients in age group 60-70 years, 11 patient in age group of 70-80 years and 7 patients in age group >80 years. The mean FBS (mg/dl) in group I was 96.6, in group II was 116 and in (%) group III was 163, RBS (mg/dl) was 132.1, 157 and 205.6 in group I, II and III respectively, HbA1C (%) was 5.3, 6.15 and 8.43, mean cholesterol level (mg/dl) was 148.6, 151.1 and 220.5, LDL (mg/dl) was 91.6, 97.5 and 154.21, HDL (mg/dl) was 41, 39.8 and 37.6, TG (mg/dl) was 106.9, 192.2 and 175.5 in group I, II and III respectively. The difference was significant (P< 0.05).
Conclusion: HbA1C can be helpful in the management and outcome of patients of ischemic stroke and TIA.

Key words: Diabetes, Glucose, TIA

1. INTRODUCTION

In 2013, worldwide prevalence of stroke was 25.7 million, with 10.3 million people having a first episode.[6] India, along with other developing countries, is seeing an increase in prevalence rates of stroke in the last few decades. In India, the estimated adjusted prevalence rate of stroke range, 84-262/100,000 in rural and 334-424/100,000 in urban areas.[1] WHO estimates suggest that by 2050, 80% stroke cases in the world would occur in low and middle income countries mainly India and China.[7] During the last one and a half decade, there is an increase of 17.5% in the number of stroke cases in India.[2]
Haemorrhagic stroke, the other major category of stroke occurs when the vessel ruptures either in the substance of the brain or in the subarachnoid space. The clinical manifestations of stroke are highly variable because of the complex anatomy of the brain and its vasculature.[3] Hemiplegia stands as the most typical symptom of cerebrovascular diseases, whether in the cerebral hemisphere or brainstem, but there are many other manifestations,

occurring in recognizable combinations. Other symptoms include paralysis, numbness, and sensory deficits of many types on one side of the body, aphasia, visual field defects, diplopia, dizziness, dysarthria, and so forth.[4]

There are many risk factors for acute ischemic stroke. These are broadly divided into modifiable and non-modifiable. The non-modifiable risk factors include age, sex, ethnicity, race, and genetics.[5] Modifiable risk factors include Diabetes Mellitus (DM), dyslipidaemia, hypertension, smoking, sedentary lifestyle. Amongst the various risk factors, hypertension, DM and dyslipidaemia are the major treatable vascular risk factors which if controlled lead to a significant decrease in incidence, morbidity and mortality of stroke.[6] The present study was conducted to evaluate correlation of HbA1C with lipid profile in patients of ischemic stroke or TIA.

2. MATERIALS & METHODS

The present study comprised of 50 patients of acute ischemic stroke or TIA of both genders, attending the outpatient department or admitted in the Medicine ward of Government Medical College and associated Guru Nanak Dev Hospital, Amritsar. Patients were informed about the study procedure and written informed consent was taken. The study was conducted after approval from institutional thesis and ethical committee.

Data such as name, age, gender etc. was recorded. Estimation of lipid profile, blood glucose level was done. Estimation of HbA1C was done by photometric test using ion exchange resin. Estimation of blood glucose level was done by glucose oxidase method. Based on blood glucose level, patients were divided into group I (normal), group II (pre- diabetics) and group II (diabetes). All data was collected, compiled and expressed as mean ± standard deviation. Statistical significance was accepted at $p < 0.05$.

3. RESULTS

Table I Age wise distribution

Age (yrs)	**Number of Patients**	**Percentage**
<50	10	20.00%
50-60	6	12.00%
60-70	16	32.00%
70-80	11	22.00%
>80	7	14.00%
Total	50	100.00%

Table I shows that there were 10 patients in age group of <50years, 6 patients in age group of 50-60 years, 16 patients in age group 60-70 years, 11 patient in age group of 70-80 years and 7 patients in age group >80 years.

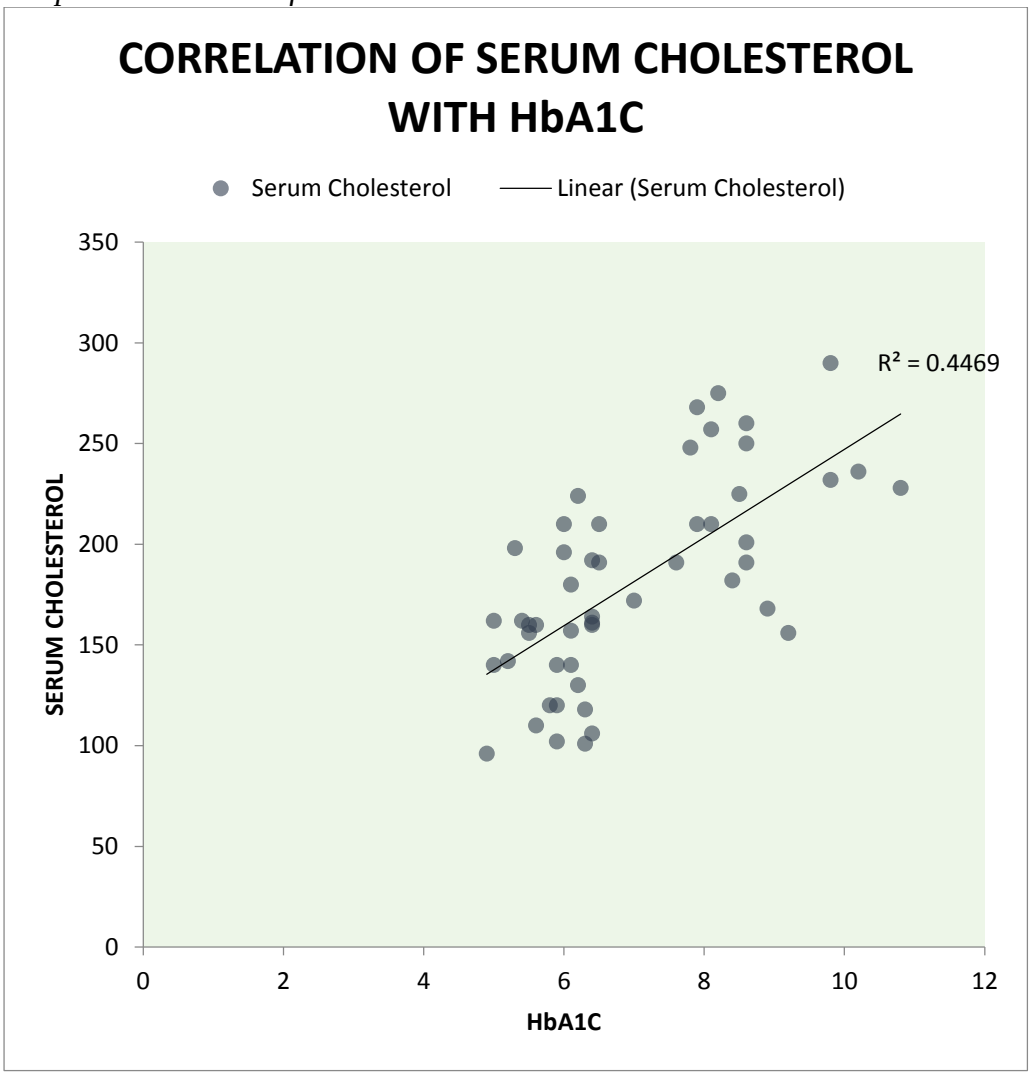
Table II Assessment of parameters

Parameters	**Group I**	**Group II**	**Group III**	**P value**
FBS (mg/dl)	96.6±15.51	116±37.5	163.09±73.35	0.003
RBS (mg/dl)	132.1±18.45	157±54.9	205.63±78.95	0.007
HbA1C (%)	5.3±0.26	6.15±02	8.43±1.8	0.001

Cholesterol (mg/dl)	148.6±28.84	151.16±37.85	220. 5±37.22	0.001
LDL (mg/dl)	91.6±33.34	97.5±30.05	154.21±50.63	0.001
HDL (mg/dl)	41±3.34	39.88±3.04	37.68±5.45	0.08
TG (mg/dl)	106.9±15.63	192.2±29.85	175.54±56.86	0.001

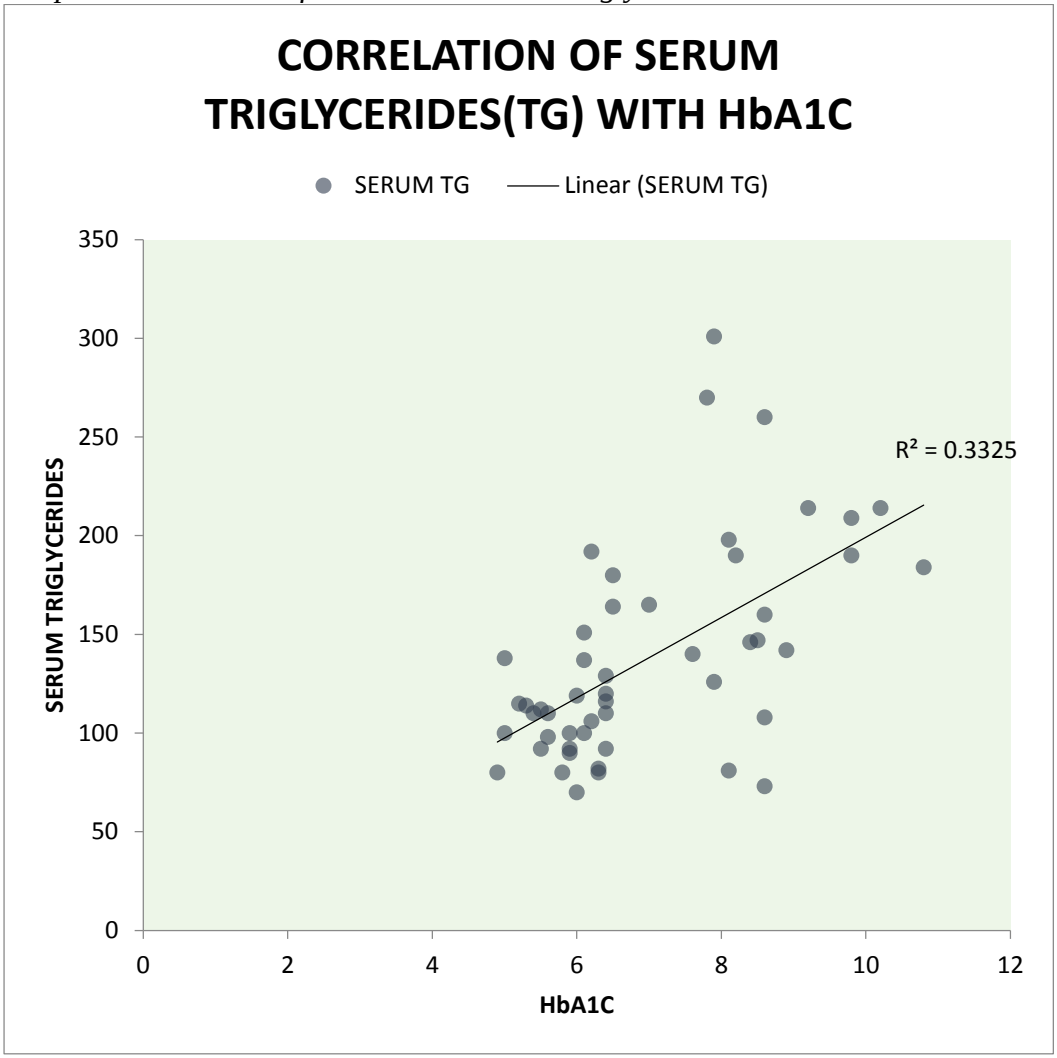
Table II shows that mean FBS (mg/dl) in group I was 96.6, in group II was 116 and in (%) group III was 163, RBS (mg/dl) was 132.1, 157 and 205.6 in group I, II and III respectively, HbA1C (%) was 5.3, 6.15 and 8.43, mean cholesterol level (mg/dl) was 148.6, 151.1 and 220.5, LDL (mg/dl) was 91.6, 97.5 and 154.21, HDL (mg/dl) was 41, 39.8 and 37.6, TG (mg/dl) was 106.9, 192.2 and 175.5 in group I, II and III respectively. The difference was significant (P< 0.05).

Graph I Correlation of HBa1C with serum cholesterol



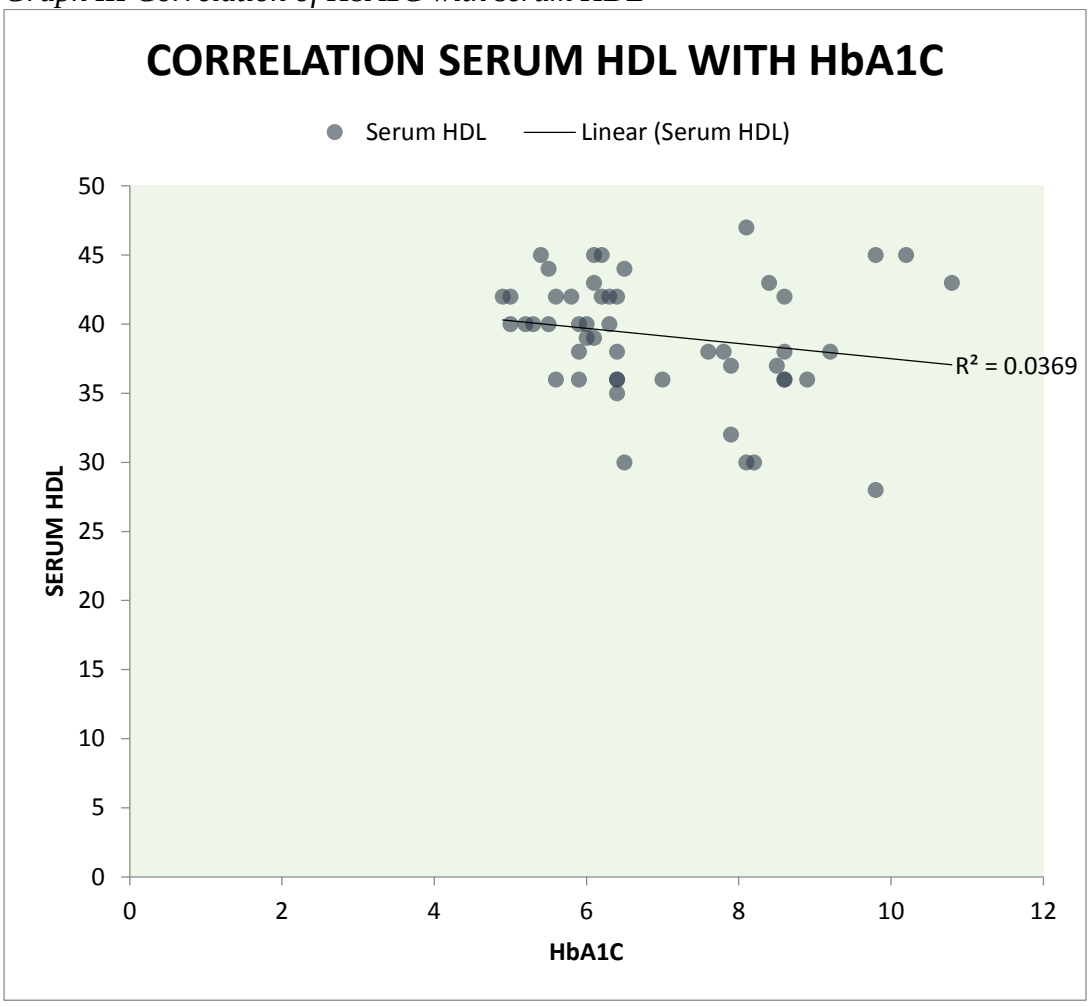
Graph I shows that the mean serum cholesterol value in study population was 181.16 mg/dl. The correlation coefficient was r = 0.6685 and a statistically significant positive correlation was found between serum cholesterol value and HbA1C, (p value <0.05).

Graph II Correlation of HbA1C with serum triglycerides



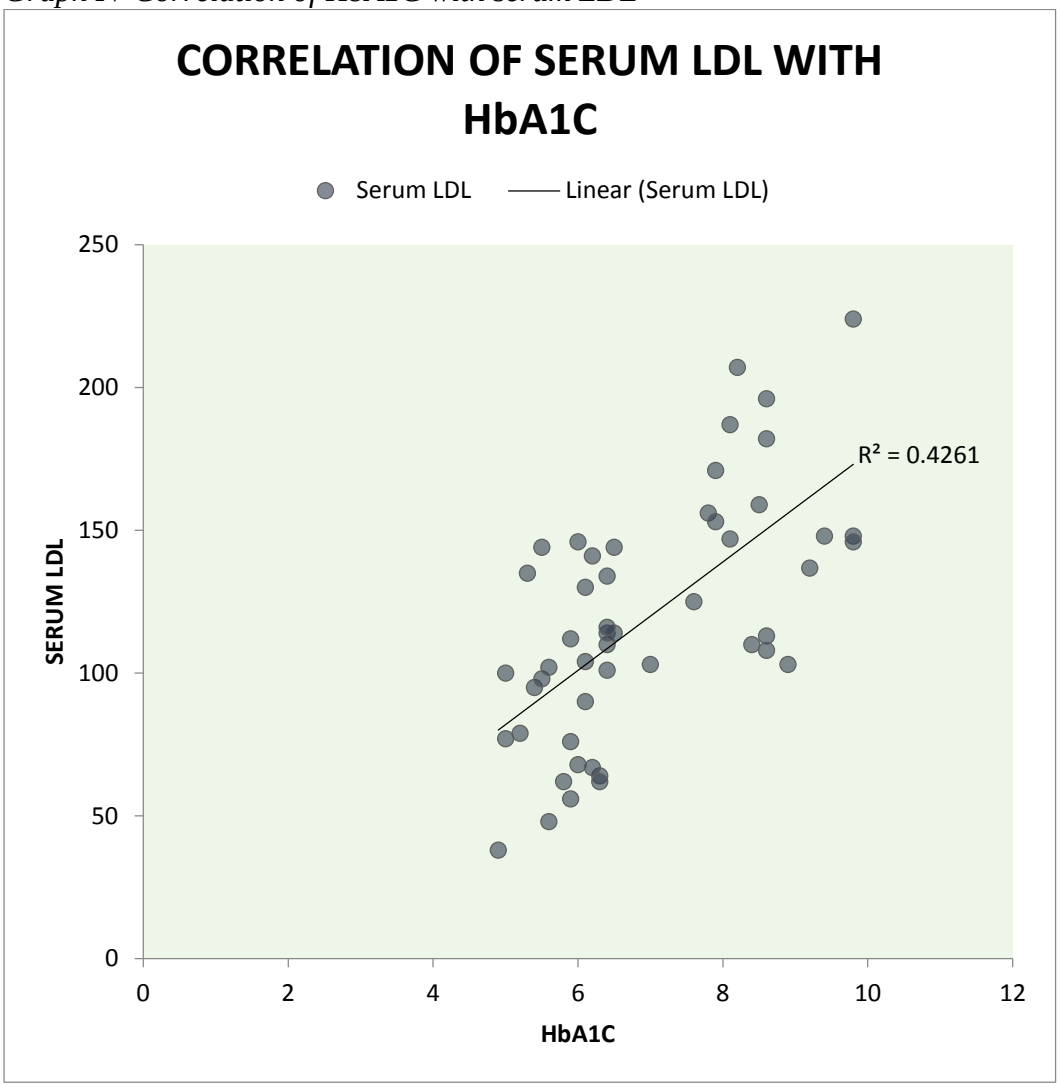
Graph II shows that the mean serum TG value in study population was 137.94±53.616 mg/dl. The correlation coefficient was r = 0.5766 and a statistically significant positive correlation was found between serum TG value and HbA1C, (p value <0.05)

Graph III Correlation of HbA1C with serum HDL



Graph III shows that the mean serum TG value in study population was 39.16±4.368 mg/dl. The correlation coefficient was r = -0.192 and a statistically non-significant correlation was found between serum HDL value and HbA1C, (p value >0.05).

Graph IV Correlation of HbA1C with serum LDL



Graph IV shows that the mean serum TG value in study population was 116.14±52.7 mg/dl. The correlation coefficient was r =0.652 and a statistically significant positive correlation was found between serum LDL value and HbA1C, (p value <0.05).

4. DISCUSSION

Although increased blood glucose is a risk factor for acute ischaemic stroke and TIA, but using only fasting and/or random blood sugar or oral glucose tolerance test would not be safe bet. In these conditions there is stress hyperglycaemia and transient insulin resistance.[7] The OGTT is an accurate measure of IGT, and it is considered a better predictor of cardiovascular diseases and conversion to DM. However, its use in acute ischemic stroke patients is limited by the effect of acute illness on the glycaemic state and the presence of dysphagia, which is common on the first day after stroke.[8] Another method to diagnose PD is the impaired fasting glucose. The interpretation of fasting glucose to detect diabetes or PD is also hindered by the acute illness. In contrast, the HbA1C level reflects long-term glycaemic control and constitutes a more accurate and stable measure than fasting blood glucose levels. HbA1C is widely used in clinical practice to assess control of DM, and in principle, it should not be affected by the acute stroke illness. In these settings glycosylated haemoglobin would be a better marker for diabetic status.[9] The present study was conducted to evaluate correlation of HbA1C with lipid profile in patients of ischemic stroke or TIA.

In present study, there were 10 patients in age group of <50years, 6 patients in age group of 50-60 years, 16 patients in age group 60-70 years, 11 patients in age group of 70-80 years and 7 patients in age group >80 years. In a study conducted by Singh et al[10], out of the 50 patients admitted with stroke, 15 cases (30%) of stroke occurred in the age group of 51 - 60 years; another 13 cases (26%) occurred in the age group of 61 - 70 years. The commonest age group affected was of 50-60 years. There were 20 cases of stroke with euglycaemia, 30 cases of stroke with hyperglycaemia including stress hyperglycaemia, newly detected diabetes, and known diabetes. Out of these patients with hyperglycaemia, 14 cases (28%) occurred in known diabetes patients, 11 (22%) occurred in new diabetes patients, and 5 (10%) occurred in stress hyperglycaemia. This study showed the high prevalence of diabetes in stroke patients.

We found that mean FBS (mg/dl) in group I was 96.6, in group II was 116 and in (%) group III was 163, RBS (mg/dl) was 132.1, 157 and 205.6 in group I, II and III respectively, HbA1C (%) was 5.3, 6.15 and 8.43, mean cholesterol level (mg/dl) was 148.6, 151.1 and 220.5, LDL (mg/dl) was 91.6, 97.5 and 154.21, HDL (mg/dl) was 41, 39.8 and 37.6, TG (mg/dl) was 106.9, 192.2 and 175.5 in group I, II and III respectively. We found that the mean serum cholesterol value was 181.16 mg/dl, mean serum TG value was 116.14±52.7 mg/dl and a statistically significant positive correlation was found between serum cholesterol value, serum TG and HbA1C, (p value <0.05).

In meta-analysis of 15 cohort studies with more than 760,000 participants conducted by Meng lee et.al[11], in 8 studies analysing pre-diabetes defined as FBS 100-125 mg/dL (5.6-6.9 mmol/L), the random effects summary estimate did not show an increased risk of stroke after adjustment for established cardiovascular risk factors (P=0.26). In 5 studies analysing pre-diabetes defined as FBS 110-125 mg/dL (6.1-6.9 mmol/L), the random effects summary estimate showed an increased risk of stroke after adjustment for established cardiovascular risk factors (P=0.03). In 8 studies with information about impaired glucose tolerance or combined impaired glucose tolerance and impaired fasting glucose, the random effects summary estimate showed an increased risk of stroke after adjustment for established cardiovascular risk factors (P<0.001). When studies that might have enrolled patients with undiagnosed diabetes were excluded, only impaired glucose tolerance or a combination of impaired fasting glucose and impaired glucose tolerance independently increased the future risk of stroke (P=0.002). Thus it was concluded that prediabetes increases the risk of future stroke but the relative risk are modest.

5. CONCLUSION

Authors found that HbA1C should be used as a screening tool in determining the previous glycaemic status, prevalence of prediabetes and differentiate it from stress hyperglycaemia. Thus HbA1C can be helpful in the management and outcome of patients of ischemic stroke and TIA.

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