

Assessing the Risk of Stroke among the Patients with Diabetes Mellitus in a Tertiary Care Hospital

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Abstract

Diabetes mellitus is a recognised independent risk factor for stroke as it contributes to the progression of atherothrombotic cerebrovascular lesions. Diabetic patients have a 1.5 to 3 times higher risk of stroke, especially cerebral infarction, than non-diabetic subjects. The study aimed to assess the level of risk on stroke among the patients with diabetes mellitus in a tertiary care hospital of South India. The study design was cross sectional descriptive research type. The study participants (n=196) were having diabetes type I or type II, above 18 years, with or without comorbidity who attended diabetic out-patient department of the hospital. National stroke association's stroke risk score card was used to assess the level of risk on stroke; data was collected by face to face interview method. Majority of the diabetic patients had caution level of risk (n=166, 84.7%); 30 (15.3%) patients had high level of risk and none of the participants (0%) had low level of risk. The level of risk of stroke among the patients with diabetes mellitus mean and standard deviation was 13.87±2.288. The study showed that diabetics had risk of getting stroke though not high risk. The patients following healthy life style can prevent stroke in future.

Key words: Diabetes, Stroke, Risk factors of stroke

Stroke is the leading cause of disability and the second most frequent cause of death worldwide (Ratan & Luft, 2018). Diabetes mellitus is a recognised independent risk factor for stroke as it contributes to the progression of atherothrombotic cerebrovascular lesions. Diabetes as a global pandemic is posing a major public health challenge worldwide. Current global estimates indicate that 415 million people are affected with this condition, this figure is projected to escalate to 642 million by the year 2040 (Podder et al, 2020; Tun et al, 2017). On one hand, diabetic patients have a 1.5 to 3 times higher risk of stroke, especially cerebral infarction than non-diabetic subjects. On other hand the prevalence of diabetes in stroke patients is between 10 and 20 percent and has been increasing over the last 20 years, probably as a result of rising rates of overweight and obesity in the general population and other factors such as sedentary lifestyle. It has been suggested that diabetic stroke patients have poorer motor and functional outcomes and are at a higher risk of dementia, recurrent stroke and death (Bejot & Giroud, 2010).

Diabetes causes various microvascular and macro-vascular changes often culminating in major clinical complications, one of which is stroke. Although gains have been made over the last two

decades in reducing the burden of stroke, the recent rise in rates of diabetes threatens to reverse these advances. Diabetes is a well-established risk factor for stroke. It can cause pathologic changes in blood vessels at various locations and can lead to stroke if cerebral vessels are directly affected (Seshadri & Wolf, 2007).

A study on prevalence and awareness of stroke and other comorbidities associated with diabetes in Northwest India by Podder et al (2020) reported that majority of the participants were unaware of the presence of hypertension (67.2%), dyslipidemia (84.5%), kidney disease (95.2%), peripheral vascular disease (34.5%), and stroke (95.1%).

Need of the study: World Stroke Organization reported that one in six people will have a stroke sometimes in their lives. Adults with diabetes have a two-to three- fold increased risk of heart attacks and strokes (Rong et al, 2016). A total of 15 million people suffer stroke worldwide each year. Of these, 5 million die and another 5 million are permanently disabled (Rao & Reddy, 2016). Approximately 425 million adults (20-79 years) were living with diabetes; by 2045 this number will rise to 629 million. About 352 million people were at risk of developing type 2 diabetes (Rama et al, 2021; Sarwar et al, 2010).

So, it is essential to assess the risk of stroke among diabetic patients which helps them adopt certain lifestyle modifications to prevent the stroke. Knowing about the level of risk of stroke helps

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prevent morbidity and mortality due to stroke, and getting appropriate treatment and adopting lifestyle modifications.

Objective

The study objective was to assess the level of risk on stroke among the patients with diabetes mellitus in tertiary care hospital in South India.

Review of Literature

A study conducted by Tun et al (2017) on diabetes mellitus and stroke showed that stroke is a major complication that tremendously increases the morbidity and mortality in patients with diabetes mellitus and poses about four times higher risk for stroke.

Another study by Owolabi et al (2019) on stroke patients with diabetes mellitus conducted in North Western Nigeria showed that out of 536 stroke patients seen during the study period, 85 had diabetes (UTS Med Centre, 2019).

Podder et al (2020) conducted a study on prevalence and awareness of stroke and other comorbidities associated with diabetes in North-West India. The study analysis revealed a higher prevalence of peripheral vascular disease (21.2%), ocular diseases (18%), and hypertension (13.4%) in diabetics with other comorbidities. The study also found that a vast majority of the participants were unaware of the presence of hypertension (67.2%), dyslipidemia (84.5%), kidney disease (95.2%), peripheral vascular disease (34.5%), and stroke (95.1%) (IDF, 2017).

Ke et al (2021) conducted a study on association of hypertension and diabetes with ischaemic heart disease (IHD) and stroke mortality in India (The million death study). Hypertension was associated with an unexpectedly high burden of cardiovascular mortality, and contributed to an increasing proportion of IHD deaths and a decreasing proportion of stroke deaths. Better management of hypertension and diabetes is urgently required to reduce premature cardiovascular mortality.

Materials and Methods

The study design was cross sectional descriptive research type. The inclusion criteria of the study participants were: diabetes type I or type II, above 18 years, with or without comorbidity and who had attended diabetic out-patient department. Patients who were critically ill and unable to respond to questions were excluded from the study. The sample size estimated was 196 with an expected percentage of diabetic patients who may develop risk of stroke (at 15% with 5% absolute precision) and 5 percent level of significance. The

study participants were selected by enumeration consecutive sampling technique. The tool used for data collection part one was socio-demographic variables which included gender, religion, educational level, marital status and clinical variables such as type of diabetes, duration of illness, family history of illness, family history of stroke, compliance of treatment, practice of diet control, weight, body mass index (BMI), habit of smoking, habit of alcoholism, co-morbidity. Part two was national stroke association's stroke risk score card which was used to assess the level of risk on stroke collected face to face (interview method). It consisted of risk factors of blood pressure, atrial fibrillation, smoking, cholesterol, diabetes, exercise, body weight, family history of stroke. High risk for stroke variables was the patient's blood pressure more than 140/90 mmHg or unknown, irregular heart beat, have smoking habit, more than 240 cholesterol level or unknown, lack of exercise, over weight and family history of stroke. Caution for stroke was blood pressure in range 120-139/80-89 mmHg, unknown atrial fibrillation, trying to quit smoking habit, cholesterol between 200 to 239, following some exercise, slightly overweight and not sure about family history of stroke. Low risk for stroke variables were: blood pressure less than 120/80 mmHg, regular heartbeat, no smoking habit, cholesterol level also below 200; regular exercise, maintaining healthy weight and no family history of stroke. In scoring procedure, each response carried one score, minimum score was one and maximum score was 24. The patients' level of risk was categorised 1 to 8 indicating low risk; 9 to 16 shows caution; and 17 to 24 high risk (Podder et al, 2020; Ke et al, 2021; Nat Stroke Assn, 2018).

Ethical clearance was obtained from JIPMER ethical committee before the data collection. National Stroke Association's Stroke risk score card was used for data collection to assess the level of risk for stroke among the diabetes patients. The data was collected by face to face/interview method in their regional language, it took 10 – 12 minutes for each participant and data collection period was 5 months.

The distribution of categorical variables such as religion, educational qualification, occupation, marital status were expressed in terms of frequency (N), percentage (%), mean and standard deviation. The comparison of continuous variables such as HBA1C, duration of diabetes mellitus and age with level risk was done using ANOVA. Chi-square test was used to find out the association between selected socio-demographic and socio-cultural factors with the level of risk for stroke among the

diabetic patients. All statistical analysis was carried out at a 5 percent level of significance and p value below 0.05 was considered significant.

Results

Table 1 shows socio-demographic variables of 196 diabetes patient; among them 113 (57.7%) were in the age group between 40-60 years, 106 (54.1%) were female, 187 (95.4%) belonged to Hindu religion, 72 (36.8%) were studied upto high school, 155 (79.1%) patients had less than Rs. 2,000 monthly income, all patients were married, 147 (75%) patients received health information from mass media. Most of the diabetic patients were insulin-dependent, half of the study participants had diabetes since less than five years, majority of the patients have smoking and alcoholism habit (Table 2). Most of the patients were involved in physical activity, and they had normal cholesterol level. It reveals that majority of the patients were not at high risk of stroke.

Table 1: Socio-demographic variables among diabetic patients (N=196)

Socio-demographic variables	Frequency (N)	Percentage (%)
<i>Age</i>		
20-40 years	10	5.1
40-60 years	113	57.7
More than 60 years	73	37.2
<i>Gender</i>		
Male	90	45.9
Female	106	54.1
<i>Religion</i>		
Hindu	187	95.4
Christian	6	3.1
Muslim	3	1.5
<i>Educational qualification</i>		
Illiterate	60	30.6
Primary education	47	24
High school	72	36.8
Higher secondary	13	6.6
Graduate	4	2
<i>Income in Rupees</i>		
Less than 2000	155	79.1
Greater than 2000	41	20.9
<i>Marital status</i>		
Married	196	100
Unmarried	0	0
<i>Source of health information</i>		
Media	147	75
Friends/relatives	41	20.9
Newspaper	8	4.1

Table 2: Clinical variables of Diabetic Patients (N=196)

Clinical variables	Frequency (N)	Percentage (%)
Insulin-dependent diabetes mellitus	189	96.4
Non-insulin dependent diabetes mellitus	7	3.6
Less than 5 years of diabetes	111	56.6
More than 5 years of diabetes	85	43.4
Had family history of diabetes	102	52
Does not have family history of diabetes	94	48
Treatment on oral glycemic agents	108	55.1
Treat by insulin	88	44.9
Following diet control	130	66.3
No diet control	66	33.7
Health check-up monthly once	181	92.4
Health check-up 3 months once	4	2
Health check-up 6 months once	11	5.6
Had smoking habit	9	4.6
No smoking	187	95.4
Habit of alcoholism	12	6.1
No habit of alcoholism	184	93.9
Underweight	19	9.7
Normal weight	106	54.1
Over weight	51	26
Obese	20	10.2
Diabetes & hypertension	90	45.9
Diabetes & cardiovascular disorder	18	9.2
Diabetes & neuro disorder	16	8.2
Diabetes only	72	36.7
Blood pressure - Normal	94	48
Blood pressure - Abnormal	102	52
Atrial fibrillation - Normal	66	33.7
Atrial fibrillation - Abnormal	130	66.3
Cholesterol - Normal	177	90.3
Cholesterol - Abnormal	19	9.7
Actively involved physical activity	177	90.3
No active involvement in physical activity	19	9.7
Over weight	68	34.7
Slight weight	14	7.1
Healthy weight	114	58.2

Table 3: Level of risk on stroke among the patients with diabetes mellitus (N=196)

Risk of Stroke	N	%	Mean	SD
Low risk (1-8)	0	0	13.87	2.288
Caution (9-16)	166	84.7		
High risk (17-24)	30	15.3		

Table 3 shows frequency and percentage wise distribution of the level of risk of stroke among the patients with diabetes mellitus. Majority of the diabetic patients had caution level of risk, 166 (84.7%), 30 (15.3%) had high level of risk and none of them participants had low level of risk 0 (0%).

Discussion

The present study reported that out of 196 patients, 113 (57.7%) were in the age group 40-60 years, 106 (54.1%) were female. The study is supported by the Rao et al (2016) conducted on prevalence of diabetes among stroke patients in India, which found that the most common age in which stroke occurred was 50-60 years (55%), followed by 61-70 years (27.1%); 31.8 percent of the patients were known diabetic and the least was stress hyperglycemic with 8.5 percent; 51 (39.5%) of the patients had ischaemic stroke while 78 (60.5%) had hemorrhagic stroke (Rao & Reddy, 2016).

The present study finding was supported by Rama et al (2021) in their prospective study on risk factors predisposing to acute stroke in India. The study reported that mostly male (72.3%), 75 percent of the sample was 50 years old or more, with a mean body mass index (BMI) of 25.8 ± 4.3 kg/m² and 14.6 percent obese patients. Hypertension and diabetes mellitus were the commonest comorbidities followed by a history of ischaemic heart disease and familial history of stroke. 20.5 percent of patients had mild strokes, 57.4 percent had moderate, and 8.4 percent experienced moderate-severe strokes, whereas 7.2 percent had severe strokes. Regarding the admission diagnoses, 56.8 percent were ischaemic, 18.6 percent were haemorrhagic, 1.1 percent had a transient ischaemic attack, 6.6 percent suffered recurrent strokes, and 17 percent were with other forms.

The level of risk of stroke among the patients with diabetes mellitus mean and standard deviation is 13.87 ± 2.288 . The study showed that majority of the patients should control all modifiable risk factors to reduce the risk and prevent further complication. This finding is supported by Sarwar et al (2010) in their study on diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. This study showed that diabetes confers about a two-fold risk for a wide range of vascular diseases, independently

from other conventional risk factors and in people without diabetes, fasting blood glucose concentration is modestly and non-linearly associated with risk of vascular disease.

A study on epidemiology of ischaemic stroke in patients with diabetes showed that diabetes is clearly one of the most important risk factors for ischaemic stroke, especially in those patients less than 65 years of age. They estimated that 37-42 percent of all ischaemic strokes in both African Americans and whites are attributed to the effects of diabetes alone or in combination with hypertension (UT Med Center, 2019). The present study highlights that most of the patients with diabetes were in the caution (high risk) category to develop the stroke.

Recommendation

There is need to develop standard protocol for the nursing personnel to educate all the diabetes patients about the importance of screening, early identification of risk factors and prevention of complications such as stroke, hypertension, and diabetic foot ulcer.

Nursing Implications

The nursing officers should educate the patients at the time of diagnosis of diabetes itself, to create awareness among the diabetic patients about the risk of stroke and preventive measures of stroke complications such as maintaining the normal glycemic level, drug compliance, diet control and exercise. Authority has to take necessary measures to develop a protocol and train the nurses for early identification of risk factors and prevention of stroke among the diabetic patients.

Conclusion

The study shows that diabetes poses risk in getting stroke. However, it can be prevented by following healthy life style practices. The health care providers should create the awareness programmes among the diabetes patients about their level of risk to get stroke and take up preventive measures to prevent further complication of stroke. The patient should also avoid risk factors like smoking, alcohol and take to regular exercise, and diet control measures as intake of low-sodium and low-fat diet, maintain the normal cholesterol level, keep the glycemic level under the control, maintain the healthy body weight.

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बेहतर स्वास्थ्य के लिए डेरी को प्रोत्साहित करना होगा

प्राकृतिक दूध में शरीर की दुरस्ती के सभी घटक मौजूद हैं: कैल्शियम, मैग्नेशियम, जिंक, फॉस्फोरस, आयोडीन, लौह, पोटेशियम, फोलेट, विटामिन ए, विटामिन डी, रिबोफ्लेविन, प्रोटीन, विटामिन बी 12, वसा आदि। सभी प्रकार के एमिनो एसिडों व फैटी एसिडों और उच्चस्तरीय प्रोटीनों से युक्त होने के कारण यह तुरंत ऊर्जा देता है। नवजात शिशु के लिए तो स्तनपान के बाद गाय का दूध आदर्श, संतुलित आहार है बशर्ते बच्चा लैक्टोज इन्टॉलरेंस का शिकार न हो। आज दुनिया में सर्वाधिक मौतों का कारण दिल की बीमारियां हैं, इससे बचाव के लिए ब्लड प्रेशर पर नियंत्रण आवश्यक है। अनेक शोधों से स्पष्ट है कि दिन में तीन बार निम्न फैटयुक्त डेरी उत्पादों के सेवन से ब्लड प्रेशर सही रहता है। दूध के नियमित सेवन से हड्डियां दुरुस्त रहती हैं, फ्रैक्चर जल्दी भरते हैं और ऑस्टियोपोरोसिस के आसार घटते हैं। कैल्शियमयुक्त होने से दूध व डेरी उत्पादों से वजन नहीं बढ़ता और मोटापा नहीं आता। अनेक अध्ययन बताते हैं कि गर्भावस्था के दौरान नियमित रूप से दूध, पनीर व अन्य डेरी उत्पादों का सेवन करती महिलाएं के शिशुओं के भ्रूण का बेहतर विकास होता है तथा बच्चों के दांत मजबूत, रोगमुक्त रहते हैं।

आम शिकायत है कि अधिकांश बच्चे दूध पीने में आनाकानी करते हैंय उन्हें फुसला-बहका कर, इसमें चॉकलेट या प्लेवर आदि डाल कर बात बनती है। दूध देख कर मुंह बनाना निखालिस बहानेबाजी नहीं है। शोधों के हवाले कुछ तबकों में आज उपलब्ध दूध को गैरजरूरी कहते हुए इसका सेवन न करने या घटाने की अपील जारी है। सदियों से अमृततुल्य माने जाते, समूची दुनिया में पसंद दूध बगैर दुरुस्त रह सकने की बात गले नहीं उतरती।

बढ़ती आय और जीवनस्तर में बेहतरी के चलते देश में दूध और डेरी उत्पादों जैसे सुगंधित दूध, मिल्कशेक, श्रीखंड, आइस क्रीम, मीठी दही, पनीर, छाछ, लस्सी, घी, बेबी फूड, क्रीम आदि की मांग लगातार बढ़ रही है जबकि उत्पादन में बाधाएं बरकरार हैं। दूध के घटते उत्पादन का एक कारण छोटे पशुपालकों के लिए खुले चरावाहों की निरंतर कटौती और चारा मिलने में किल्लत है। कुल 883.95 मीट्रिक टन हरा चारा और 583.66 मीट्रिक टन सूखे चारे की आवश्यकता के मुकाबले उपलब्धता क्रमशः 664.73 मीट्रिक टन और 355.93 मीट्रिक टन है। बेहतर स्वास्थ्य के लिए सही किस्म का दूध उपलब्ध कराने, दूध के प्रति नई पीढ़ी का रुझान बढ़ाने तथा इसकी निरंतर आपूर्ति की नए उपाय तलाशने होंगे।

प्राकृतिक दूध व दुग्ध उत्पादों के स्रोतों और इसके पौषणिक महत्व के बाबत जागृति बढ़ाने, दुग्ध उद्योग के तथ्यों से रुबरु कराने और इस वैश्विक खाद्य पदार्थ के निर्माण और सेवन को प्रोत्साहित करने के लक्ष्य से खाद्य व कृषि संगठन (एफ.ए.ओ.) 2001 से पहली जून का दिन विश्व दुग्ध दिवस के रूप में मनाता है।