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A Descriptive Study to Assess the Risk of Stroke among Individuals with Hypertension and Diabetes in the General Population of Haryana

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ABSTRACT

Background: Stroke is one of the leading causes of mortality and disability worldwide. Hypertension and diabetes mellitus are major modifiable risk factors that significantly increase the likelihood of stroke. Early identification of stroke risk among high-risk individuals can aid in timely preventive interventions and improve health outcomes.
Objectives: To determine the level of stroke risk among individuals with hypertension and diabetes.
To determine the association between socio-demographic characteristics and the level of stroke risk among individuals with hypertension and diabetes in the general population of Haryana.
Methods: A quantitative research approach with a descriptive research design was adopted for the study. A total of 58 individuals diagnosed with hypertension and diabetes were selected using a non-probability convenience sampling technique from the general population of Haryana. Data were collected using a structured socio-demographic questionnaire and the National Institutes of Health Stroke Scale (NIHSS). Descriptive statistics such as frequency and percentage were used for data analysis.
Results: The findings revealed that out of 58 participants, 37 (63.8%) had no stroke symptoms (NIHSS score = 0), 15 (25.9%) had minor stroke (NIHSS score 1–4), and 6 (10.3%) had moderate stroke (NIHSS score 5–15). None of the participants were found in the moderate-to-severe stroke (NIHSS score 16–20) or severe stroke (NIHSS score 21–42) categories. The results indicate that while the majority of participants did not exhibit stroke symptoms, a considerable proportion demonstrated mild to moderate stroke risk.
Conclusion: The study concludes that individuals with hypertension and diabetes remain vulnerable to stroke and require regular screening, monitoring, and health education to reduce stroke-related morbidity and mortality. Early identification of risk factors and implementation of preventive strategies can contribute significantly to stroke prevention in the community.

INTRODUCTION

Stroke is a major public health problem and one of the leading causes of death and disability worldwide. According to the World Health Organization (WHO), stroke occurs when blood flow to the brain is interrupted due to blockage or bleeding, leading to damage of brain cells. In 2021, stroke was the third leading cause of death and disability globally, with approximately 11.9 million new cases reported worldwide. The lifetime risk of stroke has increased considerably, and nearly one in four adults is expected to experience a stroke during their lifetime.[1]
The prevalence of stroke is rising in India. According to recent systematic reviews, stroke is one of the main causes of death and disability in the nation. In India, the prevalence of stroke varies from 44 to 757 cases per 100,000 people, whereas the incidence ranges from 105 to 152 cases per 100,000 people annually. The rising incidence of stroke presents serious problems for society and the healthcare system.
The most significant stroke risk factor that can be changed is hypertension. According to the World Health Organization, high blood pressure significantly raises the risk of both ischemic and hemorrhagic stroke and destroys blood vessels. The incidence of stroke and its related complications can be considerably decreased by effectively identifying and managing hypertension. Due to factors including population aging, urbanization, poor eating habits, physical inactivity, obesity, and stress, the prevalence of diabetes and hypertension is rising quickly in India. Consequently, a significant segment of the populace is more susceptible to stroke. Early evaluation of stroke risk in people with diabetes and hypertension can help with appropriate treatment interventions, lifestyle changes, and timely preventative measures.
Despite the fact that diabetes and hypertension are known risk factors for stroke, nothing is known about the risk of stroke among people with these conditions in Haryana's general population. Thus, it is necessary to evaluate the stroke risk among patients with diabetes and hypertension in Haryana's general population. The study's conclusions may aid medical practitioners in identifying high-risk patients, bolstering preventative measures, advancing health education, and lowering stroke-related morbidity and mortality.

Objectives

- To determine the level of stroke risk among individuals with hypertension and diabetes.
- To determine the association between socio-demographic characteristics and the level of stroke risk among individuals with hypertension and diabetes in the general population of Haryana.

METHODOLOGY

A quantitative research approach with a descriptive research design was used to obtain objective and measurable data. The study included 58 participants selected through a non-probability convenience sampling technique based on predefined inclusion and exclusion criteria. Data were collected using a structured socio-demographic questionnaire and the standardized National Institutes of Health Stroke Scale (NIHSS), a reliable instrument for assessing stroke-related neurological status. Ethical principles were maintained by obtaining administrative permission and informed consent from all participants before data collection. The collected data were systematically organized and analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation, and presented through tables and figures. The methodology ensured a systematic, reliable, and scientific approach to achieving the study objectives and provided a strong foundation for the presentation and interpretation of the study findings.

"The sample size was calculated using the formula

$$n = Z^2 pq/d^2.$$

Assuming a 95% confidence level (Z = 1.96), prevalence (p) of 50%, and an allowable error of 10%, the calculated sample size was 96. After accounting for a 10% non-response rate, the final sample size was estimated to be 106 participants."

The data were initially collected from 96 individuals, but only 58 participants had complete and valid responses suitable for analysis. Hence, the final sample comprised 58 participants.

RESULTS

The distribution of participants according to their National Institutes of Health Stroke Scale (NIHSS) scores. Out of the total 58 participants, the majority, 37 (63.8%), had an NIHSS score of 0, indicating no stroke symptoms. This suggests that more than half of the participants did not exhibit any neurological deficits at the time of assessment. A total of 15 (25.9%) participants were categorized as having minor stroke with NIHSS scores ranging from 1 to 4, indicating mild neurological impairment. Additionally, 6 (10.3%) participants were found to have moderate stroke with NIHSS scores between 5 and 15, reflecting a moderate degree of neurological deficit. None of the participants were classified under the moderate-to-severe stroke category (NIHSS score 16–20) or the severe stroke category (NIHSS score 21–42), as both categories recorded 0 (0.0%) participants.

Table 1: Distribution of Participants According to NIHSS Scores

S. No.	NIHSS Score Range	Stroke Severity	Frequency (f)	Percentage (%)
1	0	No Stroke Symptoms	37	63.8
2	1–4	Minor Stroke	15	25.9
3	5–15	Moderate Stroke	6	10.3
4	16–20	Moderate to Severe Stroke	0	0.0
5	21–42	Severe Stroke	0	0.0
Total			**58**	**100.0**

The socio-demographic characteristics of the 58 study participants. With regard to age, the highest proportion of participants, 20 (34.5%), belonged to the 51–60 years age group, followed by 16 (27.6%) participants aged above 60 years, 14 (24.1%) aged 41–50 years, and 8 (13.8%) aged 30–40 years. Regarding gender, the majority of participants were male (34; 58.6%), while 24 (41.4%) were female. Concerning educational status, 20 (34.5%) participants had completed secondary education, 18 (31.0%) had primary education, and 10 (17.2%) each were graduates or had no formal education. With respect to co-morbid diagnosis, 25 (43.1%) participants had both diabetes mellitus and hypertension, 18 (31.0%) had diabetes mellitus alone, and 15 (25.9%) had hypertension alone. Regarding duration of illness, the largest group comprised 18 (31.0%) participants who had been diagnosed for 2–4 years, followed by 16 (27.6%) participants with a duration of 1–2 years, 14 (24.1%) with illness duration of more than 5 years, and 10 (17.2%) with duration less than 1 year. Concerning treatment status, the majority of participants, 52 (89.7%), were receiving treatment, whereas 6 (10.3%) were not under treatment.

Table 2: Frequency and Percentage Distribution of Socio-Demographic Characteristics of Participants (N = 58)

S. No.	Socio-demographic Variable	Category	Frequency (f)	Percentage (%)
1	Age (Years)	30–40	8	13.8
		41–50	14	24.1
		51–60	20	34.5
		Above 60	16	27.6
2	Gender	Male	34	58.6
		Female	24	41.4
3	Highest Level of Education	None	10	17.2
		Primary	18	31.0
		Secondary	20	34.5
		Graduate	10	17.2
4	Co-morbid Diagnosis	Diabetes Mellitus	18	31.0
		Hypertension	15	25.9
		Both (DM + HTN)	25	43.1
5	Duration of Illness	Less than 1 year	10	17.2
		1-2 years	16	27.6
		2-4 years	18	31.0

		More than 5 years	14	24.1
6	Under Treatment	Yes	52	89.7
		No	6	10.3

The majority of participants, 37 (63.8%), were categorized as having low stroke risk. Fifteen (25.9%) participants had moderate stroke risk, while only 6 (10.3%) participants were found to have high stroke risk. The findings indicate that most individuals with hypertension and diabetes in the study population had a low level of stroke risk, whereas a smaller proportion were at moderate or high risk.

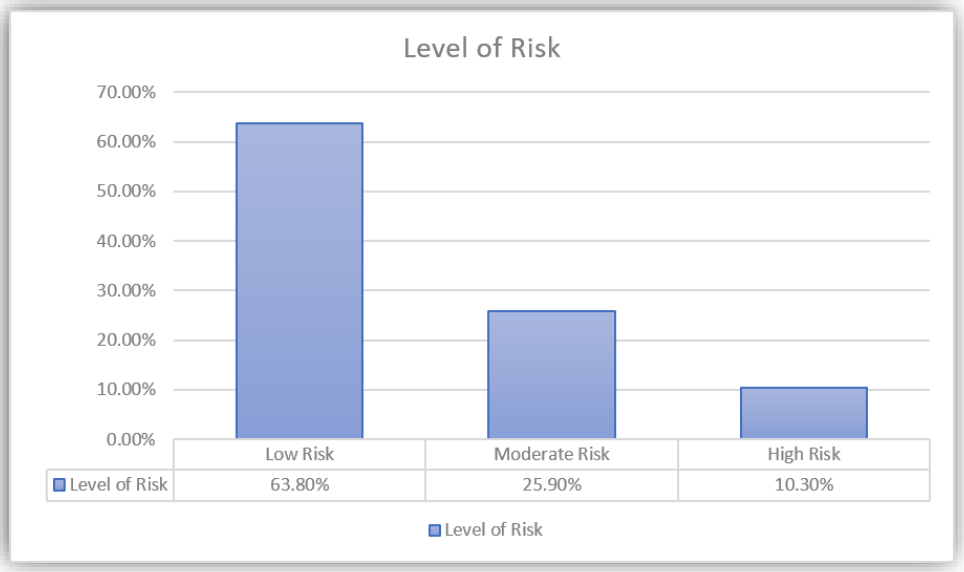

Fig.1: Level of risk of stroke among participants

The association between the level of stroke risk and selected demographic variables among individuals with hypertension and diabetes.

The findings showed that age was not significantly associated with the level of stroke risk ($x^2 = 9.42$, df = 6, $p > 0.05$). Similarly, gender did not show a statistically significant association with stroke risk ($x^2 = 4.18$, df = 2, $p > 0.05$). Co-morbid diagnosis was also not significantly associated with stroke risk ($x^2 = 8.21$, df = 4, $p > 0.05$).

In contrast, educational status demonstrated a statistically significant association with stroke risk ($x^2 = 12.86$, df = 6, $p < 0.05$), indicating that the level of education may influence an individual's risk of stroke. Likewise, duration of illness was significantly associated with stroke risk ($x^2 = 10.54$, df = 6, $p < 0.05$), suggesting that participants with a longer duration of hypertension and diabetes were more likely to have higher stroke risk levels.

Furthermore, treatment status showed a statistically significant association with stroke risk ($x^2 = 6.72$, df = 2, $p < 0.05$). Participants who were not receiving treatment tended to have a higher proportion of moderate and high stroke risk compared to those who were under treatment.

Table 3: Association Between Stroke Risk and Selected Socio-Demographic Variables Among Individuals with Hypertension and Diabetes

(N = 58)

S. No.	Demographic Variable	Category	Low Risk	Moderate Risk	High Risk	x^2	df	p-value	Significance
1	Age (Years)	30-40	6	2	0	9.42	6	>0.05	Not Significant
		41-50	9	4	1				
		51-60	12	5	3				
		Above 60	10	4	2				
		Total	**37**	**15**	**6**				
2	Gender	Male	22	8	4	4.18	2	>0.05	Not Significant
		Female	15	7	2				
		Total	**37**	**15**	**6**				
3	Educational Status	None	4	4	2	12.86	6	<0.05*	Significant
		Primary	10	6	2				

		Secondary	15	4	1				
		Graduate	8	1	1				
		Total	**37**	**15**	**6**				
4	Co-morbid Diagnosis	Diabetes Mellitus	13	4	1	8.21	4	>0.05	Not Significant
		Hypertension	10	4	1				
		Both DM + HTN	14	7	4				
		Total	**37**	**15**	**6**				
5	Duration of Illness	Less than 1 year	9	1	0	10.54	6	<0.05*	Significant
		1–2 years	11	4	1				
		2–4 years	10	5	3				
		More than 5 years	7	5	2				
		Total	**37**	**15**	**6**				
6	Under Treatment	Yes	35	12	5	6.72	2	<0.05*	Significant
		No	2	3	1				
		Total	**37**	**15**	**6**				

DISCUSSION

The findings of the present study indicate that the majority of individuals with hypertension and diabetes had no significant neurological deficits, as reflected by an NIHSS score of 0. A smaller proportion of participants demonstrated minor to moderate stroke symptoms, while none were classified as having moderate-to-severe or severe stroke. Similarly, most participants were categorized as having a low level of stroke risk, with only a limited number falling into the moderate- and high-risk categories. These findings suggest that although hypertension and diabetes are well-established risk factors for stroke, effective disease management and early identification may help reduce the occurrence and severity of stroke-related neurological impairment. The results are consistent with previous national and international studies, which reported that the majority of patients with these chronic conditions experience mild or no neurological deficits when appropriate preventive measures and treatment are followed. The study highlights the importance of regular screening, timely diagnosis, adherence to antihypertensive and antidiabetic therapy, and lifestyle modifications to minimize stroke risk. Overall, the findings emphasize the need for continuous health education and preventive interventions among individuals with hypertension and diabetes to promote early detection, improve disease control, and ultimately reduce the burden of stroke in the community. According to a multicentric prospective **study by Khurana et al. (2021) on** 526 stroke patients in India, the most prevalent risk factors for stroke were diabetes and hypertension. According to NIHSS scores, the majority of patients had mild to moderate stroke severity, but severe strokes were less frequent, according to the study. These results align with the current study, in which the majority of patients had either mild to severe neurological impairments or no stroke symptoms. In an 8-year follow-up study of diabetic patients, **Yoshinari et al. (1997)** discovered that whereas untreated hypertension diabetics had a markedly increased risk of ischemic stroke, stroke incidence remained low among normotensive and appropriately treated hypertensive persons. These results are consistent with the current study, which found that only a small percentage of participants were at high risk for stroke and the rest were classified as having low risk. **Leena Dorothy W[1], Pavithra C[2], and Umadevi A K[2]** concluded that patients with hypertension and type 2 diabetes mellitus are at a considerable risk of developing stroke, with nearly half of the participants classified as high risk. The study also found significant associations between stroke risk and factors such as education, family type, diet, body weight, and complications of hypertension. These findings emphasize the importance of early identification of individuals at risk and timely intervention. The authors highlighted that effective control of blood pressure, blood glucose, and other modifiable lifestyle factors through health education and preventive strategies can significantly reduce the risk of stroke and its complications.

CONCLUSION

The study emphasizes that diabetes and hypertension are still significant stroke risk factors that need to be well managed and continuously monitored. Preventing stroke and lowering its related problems requires early detection of stroke risk, frequent screening, treatment compliance, and adoption of healthy lifestyle habits. The results highlight the critical role that healthcare professionals—especially nurses—play in raising awareness, doing risk assessments, and putting preventative measures into place to enhance the health outcomes of people who are at risk of stroke. The study also finds that standardized instruments like the NIHSS are useful for classifying stroke risk among high-risk patients and detecting early neurological abnormalities. This aids in prompt intervention and stops minor symptoms from developing into serious neurological impairments. In community settings, early detection through systematic assessment can greatly lower morbidity and enhance patient outcomes. Furthermore, the results of the study indicate that community-based preventive healthcare services for people with diabetes and hypertension need to be techniques, health education, and routine follow-up should be prioritized. Controlling risk factors and promoting long-term well-being in high-risk groups require coordinated efforts from medical professionals, families, and the healthcare system

REFERENCE

1. Cleveland Clinic. Stroke [Internet]. Cleveland (OH): Cleveland Clinic; [cited 2026 Jun 8]. Available from: https://my.clevelandclinic.org/health/diseases/5601-stroke
2. World Health Organization. Hypertension [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Jun 8]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension

3. World Health Organization. Diabetes [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Jun 8]. Available from: https://www.who.int/health-topics/diabetes
4. World Health Organization. Stroke [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Jun 8]. Available from: https://www.who.int/news-room/fact-sheets/detail/stroke
5. Narayan SK, et al. Risk factors predisposing to acute stroke in India: a prospective study. Journal of Hypertension. 2021.
6. Johnson W, Onuma O, Owolabi M, Sachdev S. Stroke in India: A systematic review of the incidence, prevalence, and case fatality. International Journal of Stroke. 2021.
7. Kalkonde YV, et al. Incidence and prevalence of stroke in India: A systematic review. Indian Journal of Medical Research. 2017.
8. World Health Organization. Stroke [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Jun 8]. Available from: https://www.who.int/news-room/fact-sheets/detail/stroke
9. World Health Organization. Hypertension [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Jun 8]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension
10. Centers for Disease Control and Prevention. Risk factors for stroke [Internet]. Atlanta (GA): CDC; 2024 [cited 2026 Jun 8]. Available from: https://www.cdc.gov/stroke/risk-factors.
11. Khurana D, Padma MV, Bhatia R, Prasad K, Vibha D, Sylaja PN, et al. Risk factors, stroke severity and outcomes in patients with acute ischemic stroke: Results from the Indian Stroke Clinical Registry. *Neurol India*. 2021;69(6):1568-1575.
12. Yoshinari M, Iino K, Kaku K, Yamamoto M, Sato Y, Kodama T, et al. Development of ischemic stroke in normotensive and hypertensive diabetic patients with or without antihypertensive treatment: an 8-year follow-up study. *J Diabetes Complications*. 1997;11(1):9-14. doi:10.1016/S1056-8727(95)00079-8.
13. Leena Dorothy, W., Pavithra, C., & Umadevi, A. K. (2021). *A descriptive study to assess the risk of stroke among patients with hypertension and type 2 diabetes mellitus at a selected hospital, Bangalore*. *International Journal of Science and Healthcare Research, 6*(3), 407–412. https://doi.org/10.52403/ijshr.20210767