Original article

Estimation of risk of stroke in middle aged and elderly indoor patients of a medical unit in tertiary care hospital of Rawalpindi

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Abstract

Background: Stroke is a major cause of disability and mortality worldwide, with South Asian countries, including Pakistan, disproportionately affected. Identifying high-risk patients is critical to enable early intervention and reduce the stroke burden.
Methods: A cross-sectional study was conducted over five months at Medical Unit-II, Holy Family Hospital, Rawalpindi. Seventy-five inpatients aged 45-80 years with stroke risk factors, such as hypertension, diabetes, smoking, atrial fibrillation, dyslipidemia, and a family history of cardiovascular disease, were included. Data collection utilized the American Stroke Association (ASA) Stroke Risk Assessment Tool. Patients were categorized into low (score 1–5), moderate (score 6–9), and high-risk groups (score = 10). Data were analyzed using SPSS version 25.0, with t-tests and Chi-square tests applied to determine significant associations.
Results: The mean age of the study population was 62.8 ± 9.6 years, with nearly equals representation of males (49.3%) and females (50.7%). A sedentary lifestyle (68%) and hypertension (56%) were the most prevalent risk factors. Of the participants, 45.3% were classified as high-risk, with a significant association between age and high-risk score ($p < 0.05$). Older age groups (65–80 years) showed higher frequencies of high stroke risk scores.
Conclusions: This study indicates that a significant proportion of middle-aged and elderly patients with established risk factors are at high risk for stroke. Implementing routine use of the ASA Stroke Risk Assessment Tool in clinical settings may facilitate early risk identification and targeted prevention, potentially reducing stroke incidence.

Keywords: Stroke, ASA Stroke Risk Assessment Tool, risk factors, prevention, hypertension, diabetes, sedentary lifestyle, Pakistan

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1. Introduction

A stroke also called as cerebrovascular accident (CVA), is a neurological deficit resulting from interruption of blood supply to a part of brain. Two types of strokes are widely recognized; Ischemic Stroke which is the clinical event caused by interruption of blood flow to a certain part of brain by either a thrombus or an embolus and Hemorrhagic stroke which is a neurological impairment as a result of rupture of blood vessels supplying oxygen and nutrients to the brain. In both situations, the affected brain tissue undergoes cell death due to hypoxia, inadequate nutrition, and accumulation of waste products[1]. Many researches have established several modifiable and non-modifiable risk factors that significantly increase the likelihood of stroke. Among these advancing age, male gender, smoking habits, uncontrolled hypertension, diabetes, elevated plasma cholesterol levels, ischemic heart disease, and atrial fibrillation are some of the well-established risk factors[2]. Epidemiological data has revealed the global burden of stroke is approximately 15 million per annum, among which 5 million lead to fatalities and another 5 million cases are left with lifelong morbidity. Hence, global incidence of stroke varies from 76 to 119 cases per 100,000 population each year[3]. According to the current statistics, stroke has been recognized as the second leading cause of death after ischemic heart disease[4], with South Asian countries disproportionately bearing 40% of global stroke-related fatalities[5]. Pakistan alone is estimated to have millions of people affected by stroke, reflecting a significant public health challenge[4, 5]. While Western nations have achieved a 42% reduction in stroke incidence over the past two decades, the incidence in Asian countries, including India and China, has risen substantially[6]. The increasing burden of cerebrovascular accidents (CVA) in Pakistan requires urgent emphasis on prevention, early detection, and timely intervention to mitigate these risk factors in general population[7]. The American Stroke Association (ASA) Stroke Risk Assessment Tool, also known as the ASA/ACCF/AHA Stroke Risk Calculator, provides healthcare professionals with a screening mechanism to assess individual stroke risk by accounting for various factors. This tool not only aids clinicians in making informed health management decisions but also can be used to support researchers and public health professionals in

identifying high-risk groups, evaluating existing preventive measures, and designing targeted interventions to lower stroke incidence and promote public health. The significance of assessing stroke risk among the hospitalized patients, particularly those in middle to older age groups with established risk factors, lies in the potential for early intervention. Hospitalized patients present a unique opportunity for clinicians to identify, monitor, and manage modifiable risk factors more closely, which can be challenging in outpatient settings. In healthcare system of countries with limited resources such as Pakistan, utilizing the American Stroke Association (ASA) Stroke Risk Assessment Tool to plan patient-specific preventive strategies will help prioritize high-risk individuals. This can lead to a possible reduction in morbidity, mortality, and healthcare costs associated with stroke. In this study, we employed the ASA Stroke Risk Assessment Tool to estimate stroke risk in middle-aged and elderly patients admitted to Medical Unit-II, Holy Family Hospital, Rawalpindi.

2. Materials & Methods

This cross-sectional study was conducted at Medical Unit-II Holy Family Hospital, Rawalpindi, over five months from June to October 2022. The study included 45 to 80 years old patients managed in Medical Unit-II who were known to have risk factors for stroke like; hypertension, diabetes mellitus, smoking, atrial fibrillation, dyslipidemia, and family history etc. Patients were included by convenience sampling after taking informed consent. Patients using any form of anticoagulation therapy, such as warfarin, direct oral anticoagulants (DOACs), or parenteral anticoagulants, were excluded from the study.

Data collection was performed through structured interviews, using a pre-designed proforma based on the American Stroke Association (ASA) Stroke Risk Assessment Tool. Based on ASA Stroke Risk Assessment Tool each patient's risk was assessed by evaluating specific variables, including age, blood pressure, diabetes status, smoking, atrial fibrillation, body mass index (BMI), cholesterol levels, diet, physical activity, and family history of stroke or cardiovascular disease. Patients were categorized into three risk groups: those with a score between 1 and 5 were classified as low risk, those scoring between 6 and 9 as moderate risk, and those with a score of 10 as high risk.

Data was entered and analyzed using SPSS version 25.0. Quantitative variables, such as age and BMI, were summarized as mean and standard deviation, while qualitative variables, like gender and risk factor presence, were reported as frequencies and percentages. P value was calculated using t-test or Chi square test test where applicable. P value <0.05 was considered significant.

3. Results

Mean age of the patients was 62.8 ± 9.6 years, with an almost equal distribution of males (49.3%) and females (50.7%). The mean Body Mass Index (BMI) was 27.2 ± 2.6 kg/m², indicating a prevalence of overweight status (BMI >25) in over half of the participants (52%). Table I provides details in demographic context. Sedentary lifestyle (68%), and hypertension were commonest risk factors. Details in this regard are given Table II. The association of certain risk factors with high stroke risk scores was statistically significant. For instance, a higher prevalence of hypertension, sedentary lifestyle, and atrial fibrillation were significantly associated with increased stroke risk scores ($p < 0.05$). Table III shows distribution across ASA Tool based grouping. 45.3% of patients were in high-risk category. Most of high-risk patients were found in the older age brackets, specifically those aged 65 and above ($p < 0.05$). Details are given in Table III. High stroke risk scores (score = 10) were distributed across age groups, with older age groups showing a higher frequency of high-risk patients. As shown in Table IV, 26.5% of high-risk patients were aged 65–74, while another 26.5% were aged 75–80 ($p < 0.05$).

Table I: Demographic Characteristics of Study Population (n=75)

Variable	Category	n (%)
Age (years)	Mean ± SD	62.8 ± 9.6
Age Groups	45–54	11 (14.6)
	55–64	15 (20.0)
	65–74	22 (29.3)
	75–80	27 (36.0)
Sex	Male	37 (49.3)
	Female	38 (50.7)
Body Mass Index (kg/m²)	Mean ± SD	27.2 ± 2.6
	BMI >25 (Overweight)	39 (52.0)

Table II: Prevalence of Stroke Risk Factors in Study Population (n=75)

Risk Factor	n (%)
Hypertension	42 (56.0)
Diabetes Mellitus	36 (48.0)
Sedentary Lifestyle	51 (68.0)
Diet Rich in Fats	30 (40.0)
Atrial Fibrillation	31 (41.3)
Smoking	34 (45.3)

Family History of Stroke	39 (52.0)
Elevated Cholesterol (>160 mg/dL)	22 (29.3)

Table III: Stroke Risk Categories Based on ASA Tool (n=75)

Risk Group	Score Range	n (%)
Low Risk	1–5	19 (25.3)
Moderate Risk	6–9	22 (29.3)
High Risk	10	34 (45.3)

Table IV: Age-Wise Distribution of High Stroke Risk Scores (Score = 10, n=34)

Age Group (years)	n (%) of High-Risk Patients
45–54	5 (14.7)
55–64	11 (32.4)
65–74	9 (26.5)
75–80	9 (26.5)

4. Discussion

Majority of our patients with stroke had moderate to high ASA Stroke Assessment Tool score. The prominent risk factors identified were hypertension, diabetes, sedentary lifestyle, and elevated BMI. These findings are consistent with findings from a 2021 meta-analysis, which emphasized these factors as key contributors to stroke globally[8]. Ou r findings suggest urgent need for targeted preventive strategies in Pakistan, where stroke remains a leading cause of disability and mortality.

Unlike countries, where public health initiatives have achieved a notable reduction in stroke incidence, Pakistan continues to face an increasing stroke burden[9]. Limited improvement in managing modifiable risk factors, such as lifestyle changes, blood pressure, and glucose control, likely contributes to this trend. Furthermore, social determinants such as restricted healthcare access, low awareness levels, and cultural norms influencing diet and activity, further contribute to this high prevalence of risk factors of stroke. The findings of our research indicate the need for broader regional data to devise strategies tailored to address local barriers and behaviors.

The use of the ASA Stroke Risk Assessment Tool in this study demonstrated its efficacy for identifying high-risk individuals. This tool's predictive value highlights its applicability in both inpatient and outpatient settings for early risk identification and patient-specific preventive guidance. Early identification through such tools allows for proactive risk factor management, including lifestyle counseling, diet modifications, and physical activity recommendations. Utilizing this tool for routine screenings could enhance healthcare providers' capacity to prioritize preventive care and provide tailored guidance for high-risk patients.

Our findings underscore the value of implementing public health initiatives to increase awareness of stroke risk factors. Community-focused educational programs, emphasizing lifestyle modifications to control hypertension, diabetes, and obesity, could be instrumental in reducing stroke incidence. Training healthcare professionals in effective counseling on stroke prevention could also bridge the gap between risk identification and actionable lifestyle changes, empowering patients to take an active role in managing their health.

This study has limitations, including a relatively small sample size and a single-centered design, which may affect the generalizability of our findings. Additionally, the convenience sampling approach may introduce selection bias. Future research involving larger sample sizes and multi-centered studies is recommended to validate these findings and strengthen the evidence base intervention for targeted stroke prevention in Pakistan.

5. Conclusion

This study reveals that 45.3% of middle-aged and elderly patients with major risk factors like hypertension, diabetes, sedentary lifestyle, and BMI >25 are at high risk for stroke. Routine utilization of the ASA Stroke Risk Assessment Tool in both outpatient and inpatient settings could aid in educating patients about their individual risk profiles, empowering them to make positive lifestyle changes.

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