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ORIGINAL ARTICLE

Frequency of Acute Ischemic Stroke among Pregnant Females

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ABSTRACT

Background: Ischemic stroke during pregnancy is a rare but potentially life-threatening condition, which is essential to be recognized through the clinical signs and symptoms promptly for ensuring timely medical intervention.
Objective: To determine the frequency of ischemic stroke among pregnant females.
Study design: Prospective cohort study
Place and duration of study: Department of Neurology, Sialkot Medical College, Sialkot from 1st January 2022 to 30th June 2023.
Methodology: One thousand pregnant females were admitted in gynaecology unit and also on the post-partum females up to 42 days period were enrolled. Hospital duration was recorded inform of days. The pregnant women who were presenting clinical symptoms of ischemia stroke were assessed for confirmation through radiological imaging including MRI or CT scan. Diffusion weighted images (DWI) was used in some cases for assisting the MRI imaging.
Results: The post-partum readmission had the highest risk of ischemic stroke as well as occlusion, stenosis and vascular syndromes. The overall frequency of ischemic stroke in admitted pregnant females was around 3.55% .Maximum hospital stay length was observed among pregnant females suffering from ischemic stroke. The crude and adjusted odds ratio was compared in terms of maternal age, parity, comorbidities as well as migraine. It was found that despite of maternal age >40 years the high risk factors of ischemic stroke are multifetal gestation, preeclampsia, eclampsia, migraine.
Conclusion: There is a 3.55% frequency of ischemic stroke with pregnant females. The frequency increases in presence of risk factors including maternal age, multiparous, multifetal gestation, preeclampsia, eclampsia, obesity and anemia.
Keywords: Frequency, Acute ischemic stroke, Pregnant females.

INTRODUCTION

A stroke occur when the blood supply to the brain is interrupted or reduced, either due to a blockage (ischemic stroke) or a rupture (hemorrhagic stroke) of blood vessels. This can lead to brain cell damage or death, resulting in various symptoms and potential long-term effects. There are various types of stroke including Ischemic Stroke (87% of cases which are caused by a blockage, often due to blood clots, plaque, or other debris. Hemorrhagic stroke (13% of cases) caused by a rupture of blood vessels leading to bleeding in the brain. Transient Ischemic Attack (TIA) which is caused by temporary blockage, often called a "mini-stroke," which resolves on its own. The symptoms of a stroke, includes sudden weakness or numbness in the face, arm, or leg, confusion or trouble speaking, trouble seeing in one or both eyes, severe headache and sudden difficulty walking or maintaining balance.[1]

The effects of stroke results in weakness or paralysis, cognitive impairment, speech and language difficulties, vision changes, emotional changes and fatigue. The treatment and prevention of stroke requires emergency medical treatment, including thrombolytic therapy (clot-busting medication), rehabilitation, including physical, occupational, and speech therapy and lifestyle changes[1-3]. The prevalence of stroke is projected with an increase of 1.1 million until 2000 to 1.5 million until 2025 annually in European region.[2] In pregnancy and peripartum the incidence of ischemia has been reported as rater with a risk of 10/10000 cases development, however with the increase in time the incidence has been reported to escalate upto 30/10000 cases.[3,4]

Ischemic stroke during pregnancy is a rare but potentially life-threatening condition, occurring in approximately 1 in 5,000 to 1 in 30,000 pregnancies. It's essential to recognize the signs and symptoms promptly to ensure timely medical intervention.[5-7] The cause and risk factors include hypertension, preeclampsia, thrombophilia's (blood clotting disorders), cardiac conditions, diabetes, obesity, multiple pregnancy, history of previous stroke or transient ischemic attack (TIA). The diagnosis is based on neuroimaging studies (MRI or CT scans) or blood tests (to identify underlying conditions.[8,9]

There are various methods of neuroimaging dependent upon the condition and clinical symptoms of the pregnant female. Non contrast CT scan of head is recommended by many researchers as this is the only CT scan which provides least radiations to the fetus.[9,10] The present study was designed to analyses the frequency of ischemic strike presence in the pregnant females. The results of this study provided a detail insight into real situation of ischemic stroke among pregnant females and further this study can be used for improving, preventing the ischemia in pregnant females.

MATERIALS AND METHODS

This prospective cohort based study was conducted at Department of Neurology, Sialkot Medical College, Sialkot from 1st January 2022 to 30th June 2023 on the antenatal admission in gynaecology unit and also on the post-partum females up to 42 days period. A written informed consent was taken from each participant of the study. All antenatal women admitted in the gynecological unit within the age group of 16^{+} years were included. A total of 1000 pregnant females were enrolled. The sample size was generated through available sample size generation software using 95% confidence of interval with 5% margin of error and 80% power of test. The prevalence of ischemia stroke applied for samples size generation was considered as 5% among pregnant females. The pregnant women were assessed at three levels: antenatal, emergency admissions and postpartum readmission within 42 days of delivery. Those females having previous history of renal disease, superficial thrombophlebitis, deep vein thrombosis, hemorrhagic stroke, prolactinemia or any previous history of stroke were excluded from the study. A well structured questionnaire was used for documenting all related information including demographic and residence information, previous clinical history of hypertension, preeclampsia, postpartum hemorrhage, obesity,

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BMI, anemia, blood transfusion, coronary heart disease, gestational age, parity as well as date of admission and status at discharge and main clinical diagnosis. The International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canadian version was applied for the diagnostic categorization of data. It included ischemic stroke, and not specified and specified stroke. The ischemia was determined through the frequency of the ischemic stroke was assessed from the total admission made and their follow up report up to 42 days. Hospital duration was recorded inform of days. The ischemic stroke was defined as o occurrence of a blood clot, known as a thrombus which blocks or plugs an artery leading to the brain. The pregnant women who were presenting clinical symptoms of ischemia stroke were assessed for confirmation through radiological imaging including MRI or CT scan. MRI was preferred for preventing any kind of harm to the fetus. The CT imaging was only applied in rare cases where only the maternal head was exposed with minimal exposure of radiation to the growing fetus. An MRI of the brain without contrast is achieved as gadolinium is known to cross the placenta. The MRI identified the location and extent of the stroke, acuity, and aetiology of the infarction. Diffusion weighted images (DWI) was used in some cases for assisting the MRI imaging. Data was analyzed using Chi square and odds ratio tool of SPSS-26.0 wherein p value <0.001 was considered as significant.

RESULTS

The post-partum readmission had the highest risk of ischemic stroke as well as occlusion, stenosis and vascular syndromes. The overall frequency of ischemic stroke in admitted pregnant females was around 3.55% with 47/429 patients readmitted after postpartum having one type or other of ischemic stroke (Table 1).

The length of hospital stay among females having ischemic stroke presented data wherein the maximum hospital stay length was observed among pregnant females suffering from ischemic stroke in general followed by cerebrovascular disease which does not result in stroke (Table 2)

The mean age of the pregnant females was found as 25.5±3.4 years with highest frequency within the group of 20-25 years. However the risk of ischemic stroke was analyzed as highest among pregnant women above the age of 40 years with hypotensive, anemia and obesity as main risk factors. Multiparous and multifetal gestation also has higher incidence risk of ischemic stroke (Fig. 1).

The crude and adjusted odds ratio was compared in terms of maternal age, parity, comorbidities as well as migraine. It was found that despite of maternal age >40 years the high risk factors of ischemic stroke are multifetal gestation, preeclampsia, eclampsia, migraine (Table 3).

Table 1: Frequency of ischemic stroke in pregnant and post partum females (n=1000)

Type of Ischemia Stroke	Antenatal (n=1085)	Emergency hospitalization for delivery (n=486)	Postpartum readmission n=429	Rate/1000 deliveries
Ischemic	13 (1.19%)	1 (02%)	12 (2.7%)	26 (2.6%)
Stroke not specified	2 (0.18%)	1 (0.2%)	10 (2.3%)	13 (1.3%)
Occlusion, stenosis of precerebral and cerebral arteries, TIAs, vascular syndromes (not resulting in stroke)	4 (0.36%)	2 (0.4%)	20 (4.6%)	26 (2.6%)
Other cerebrovascular diseases (not resulting in stroke)	1 (0.09%)	--	5 (1.1%)	6 (0.6%)
Total	20 (1.84%)	4 (0.82%)	47 (10.9%)	71 (3.55%)

Table 2: Length of hospital stay among pregnant and postpartum female undergoing ischemic stroke or cerebrovascular disease

Stroke Subtypes and Other Related Conditions	Number	Length of stay	No. (%, 95% CI) with a length of stay >7 d
Ischemic stroke	26	13.1±12.6	24 (20.7, 22.1–25.3)
Stroke not specified	13	4.9±6.8	8 (14.7, 6.1–12.8)
Occlusion, stenosis, TIAs, and vascular syndromes not resulting in stroke	26	5.6 ±4.3	23 (16.9, 11.1–24.3)
Other cerebrovascular diseases not resulting in stroke	6	5.7±6.1	5 (5.0, 5.2–5.5)

Table 3: Comparison of risk factors for ischemic stroke within pregnant females (n=132)

Characteristic	Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Maternal age (<20 years)	1.3 (0.7–3.1)	1.2 (0.8–3.7)
20–29	1.0	1.0
30–34	1.2 (0.8–1.7)	1.0 (0.7–1.6)
35–39	1.5 (0.9–2.4)	1.3 (0.9–2.1)
≥40	1.8 (0.8–3.7)	1.7 (0.6–2.7)
Parity 0	0.7 (0.3–1.6)	0.6 (0.3–1.4)
1	1.0	1.0
2	2.0 (1.1–4.3)	2.0 (1.0–4.3)
≥ 3	4.7 (1.9–12.0)	4.2 (1.6–11.1)
Unknown	7.8 (4.4–13.5)	7.1 (3.9–12.4)
Multifetal gestation	6.3 (3.3–11.5)	3.6 (1.9–7.3)
Chronic hypertension	5.3 (1.9–13.9)	2.4 (0.9–7.8)
Gestational hypertension	1.2 (0.6–2.6)	1.2 (0.5–2.6)
Preeclampsia	9.5 (5.6–16.2)	5.2 (2.9–9.2)
Eclampsia	61.4 (25.2–150)	38.1 (14.9–97.4)
Migraine	24.4 (3.5–174.3)	10.3 (1.4–77.5)
Anemia	5.5 (3.3–9.5)	1.9 (0.9–3.5)
Obesity	2.5 (0.9–6.6)	2.2 (0.8–6.1)

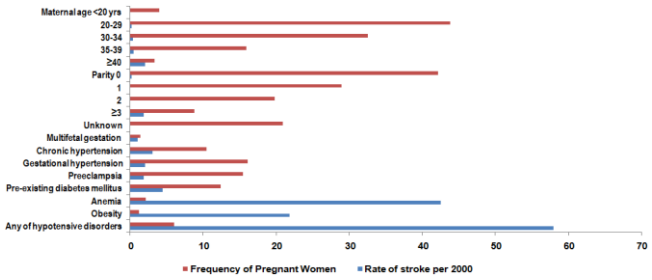

Fig. 1: The frequency and rate of ischemic stroke among pregnant females

DISCUSSION

The rates of stroke presented in the current study suggested that cases having clinical history of preeclampsia, eclampsia, migraines or multifetal gestation were at a high risk of developing ischemic stroke. The frequency of ischemic stroke was reported as 3.55% within the pregnant females admitted. Literature supports an ischemic stroke incidence of 13.4 to 27/100 000 deliveries. However, there is a variance in the rate reported at different regions of the world. The US countries report a higher frequency of the ischemic stroke than other countries. The difference is presented due to geographical changes related with various lifestyle adaptation including high smoking and drinking habits among developing countries.[11-13]

An increased risk of ischemic stroke in the postpartum women and the patients having heart disease history or hyper/hypotensive have also been identified as more prone to ischemic attacks. Recent research reported odds ratio high association with eclampsia.[14,15] Similar results have been reported in the current study with a significant association of preeclampsia, eclampsia, and migraine with increased frequency of ischemic stroke among pregnant women.[16]

Stroke events in the antepartum and postpartum periods were identified after linking childbirth and other hospitalizations. Maternal history of smoking, ethnicity, and socio-economic status was unavailable in present study analysis however other researchers have also presented data without the complete details to ethnicity.[17] Among other important factors which can lead to ischemic stroke are cerebrovascular disease as well as maternal age, hypertension. Literature has evidently reported that for the

maternal health it is very important to identify and prevent the factors which can result into ischemic stroke.[18-20]

CONCLUSION

There is a 3.55% frequency of ischemic stroke with pregnant females. The frequency increases in presence of risk factors including maternal age, multiparous, multifetal gestation, preeclampsia, eclampsia, obesity and anemia.

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