

DOI: <https://doi.org/10.36719/2663-4619/87/53-57>

**Sevinj Arif Aliyeva**

Azerbaijan Medical University

Doctor of Philosophy in Medicine

sevinc.dr@mail.ru

**Shahla Malikmammad Asgarova**

Azerbaijan Medical University

Doctor of Philosophy in Medicine

shahla.doctor@mail.ru

**Gultakin Rafiq Javadova**

Azerbaijan Medical University

Doctor of Philosophy in Medicine

gulya@mail.ru

**Aytan Mamed Rzayeva**

Azerbaijan Medical University

Doctor of Philosophy in Medicine

dr.rzayeva@mail.ru

## ETIOPATHOGENETIC RISK FACTORS FOR STROKE IN PREGNANT WOMEN

### Abstract

Stroke is a severe thrombotic condition that can occur in women of reproductive age during their pregnancy. Physiological changes that occur during pregnancy, childbirth and the postpartum period predispose a woman to the development of thrombotic complications. However, the true causes of cerebrovascular accidents are not fully understood. More than 50% of strokes occur in the absence of obvious risk factors. The article reviews etiological and pathogenetic mechanisms of cerebral blood flow disorders and factors contributing to this condition in pregnant women.

**Keywords:** *ischemic stroke, hemorrhagic stroke, pregnancy, risk factors, physiological changes, antiphospholipid syndrome*

**Sevinc Arif qızı Əliyeva**

Azərbaycan Tibb Universiteti

tibb üzrə fəlsəfə doktoru

sevinc.dr@mail.ru

**Şəhla Məlikməmməd qızı Əsgərova**

Azərbaycan Tibb Universiteti

tibb üzrə fəlsəfə doktoru

shahla.doctor@mail.ru

**Gültəkin Rafiq qızı Cavadova**

Azərbaycan Tibb Universiteti

tibb üzrə fəlsəfə doktoru

gulya@mail.ru

**Aytən Mamed qızı Rzayeva**

Azərbaycan Tibb Universiteti

tibb üzrə fəlsəfə doktoru

dr.rzayeva@mail.ru

## Hamilə qadınlarda insult üçün etiopatogenetik risk faktorları

### Xülasə

İnsult, reproduktiv yaşda olan qadınlarda hamiləlik dövründə baş verə biləcək ağır trombotik vəziyyətdir. Hamiləlik, doğuş və doğuşdan sonrakı dövrdə baş verən fizioloji dəyişikliklər qadını trombotik ağırlaşmaların inkişafına meyilləndirir. Bununla belə, serebrovaskulyar problemlərin əsl səbəbləri tam başa düşülmür. İnsultların 50%-dən çoxu aşkar risk faktorları olmadıqda baş verir. Məqalədə hamilə qadınlarda serebral qan axınının pozulmasının etioloji və patogenetik mexanizmləri və bu vəziyyətə səbəb olan amillər nəzərdən keçirilir.

**Açar sözlər:** *işemik insult, hemorragik insult, hamiləlik, risk faktorları, fizioloji dəyişikliklər, antifosfolipid sindromu*

### Introduction

A stroke during pregnancy or puerperium is a rare event, but markedly affects the future life of the woman and her family. Pregnancy-associated stroke (PAS) accounts for up to 15% of maternal deaths (Say, Chou, Gemmill, Tunchalp, Moller, Daniels, 2014: 323-333). The reported incidence of PAS and the distribution of stroke subtypes, ischaemic stroke (IS), intracerebral haemorrhage (ICH), subarachnoid haemorrhage (SAH) and cerebral venous thrombosis (CVT), varies greatly due to different inclusion criteria and study designs. A recent meta-analysis reported an incidence of 30 strokes per 100,000 deliveries among all pregnancies (Swartz, Cayley, Foley, Ladhani, Leffert, Bushnell, 2017: 687-697). The incidence of PAS varies depending on gestational age, with the greatest risk observed during the third trimester, delivery and the early postpartum period (Cantu-Brito, Arauz, Aburto, Barinagarrementeria, Ruiz-Sandoval, Baizabal-Carvalho, 2010: 59; Leffert, Clancy, Bateman, Bryant, Kuklina, 2015: 124-131). The latest studies indicate an increase in the PAS incidence, primarily as a result of an increase in hypertensive disorders of pregnancy and cardiac disease in pregnant women (Leffert, Clancy, Bateman, Bryant, Kuklina, 2015: 124-131).

The outcome of stroke varies, but full recovery is possible, particularly in high-income countries. Since these women are of reproductive age, they often wish to conceive again. However, there is significant uncertainty surrounding the potential risks related to subsequent pregnancies and data on future health and long-term prognosis of these women are limited. The aim of this systematic review is to summarise the current knowledge on the subsequent pregnancies and future health of women with PAS and knowledge gaps in order to highlight the need for further research on the topic, essential for adequate counselling, pregnancy surveillance and secondary prevention throughout life in the future.

Acute cerebrovascular accident (ACV) is one of the most life-threatening in general clinical practice, imposing a significant burden on healthcare. In reproductive age, the frequency of strokes is relatively low. According to epidemiological data, among people under the age of 35, strokes are diagnosed more often in women than in men, and are characterized by more severe consequences.

Up to 35% of strokes in women aged 15 to 45 years are associated with the gestational period (Dombrovsky, Omelyanovsky, 2014: 20-5). According to the latest data, the frequency of this pathology in pregnant women and puerperas ranges from 4 to 41 per 100 thousand births (Gnezditsky, Korepina, Karlov, 2016: 012-021). Previously published information on the prevalence of strokes in the gestational period was characterized by a wide scatter – from 4.3 to 210 cases per 100 thousand births, which was associated with differences in the definition of criteria, methods used for diagnosing cerebrovascular accidents and insufficient samples (Akhvlediani, Logutova, Travkina, 2015: 15665-71). Despite the fact that the development of stroke in pregnant women is considered a rare phenomenon, it is of particular importance due to the severity of the pathology, disability of patients, and an increase in maternal and perinatal mortality (Treadwell, Thanvi, Robinson, 2007).

In recent years, there has been an increase in interest in the problem of strokes associated with pregnancy. An increase in the frequency of this complication was noted, which is probably due to

the introduction of imaging methods and an increase in the possibilities for diagnosing circulatory disorders and their consequences, an increase in the frequency of diseases predisposing to circulatory disorders (overweight, obesity, diabetes mellitus, arterial hypertension, metabolic syndrome, etc.), as well as the widespread use of reproductive technologies.

During the past two decades knowledge on the incidence and risk factors of PAS has accumulated. By contrast, data on subsequent pregnancies and health of women with PAS are scattered, incompletely reported and limited information is available. The systematic review suggests that the incidence of pregnancy complications is comparable to that reported for women with a history of stroke (related or not related to pregnancy)

Thus, in the United States, the frequency of strokes during pregnancy and in the early postpartum period over 12 years (from 1994 to 2007) increased by 47 and 83%, respectively. In the last decade, the incidence of stroke in obstetric practice continues to increase, which is a serious problem and requires deep and detailed study.

In most cases (about 90%), stroke develops in the third trimester of pregnancy and in the postpartum period (Davie, O'Brien, 2015: 52-6). Data on which type of stroke (ischemic or hemorrhagic) is more common in pregnant women and puerperas is contradictory. The results of studies in recent years demonstrate a higher frequency of cerebrovascular accidents during the gestation period of the ischemic type than of the hemorrhagic type – 3.9 per 100 thousand births and 1.7 per 100 thousand births, respectively (Scott, Bewley, Rudd, 2012: 318-24).

Etiology and pathogenesis. Direct cause of ischemic thrombosis, embolism, cerebral vasospasm and hypoperfusion can become a stroke.

It has been noted that if in elderly people the main cause of stroke is atherosclerosis as the cause of cerebral thrombosis and ischemic necrosis of the brain, which often occurs against the background of a number of long-term chronic diseases, including arterial hypertension, dyslipidemia, diabetes mellitus, coronary heart disease, then for strokes in pregnant women, this factor is much less significant. Atherosclerotic lesions of cerebral vessels were detected only in 15-25% of cases of fatal stroke (Yoshida, Takahashi, Takenobu, 2017: 276-82).

The pathogenesis of hemorrhagic stroke is associated with vascular anomalies against the background of elevated blood pressure. The main reason is the rupture of blood vessels in the places of arterial aneurysms and various types of malformations (arteriovenous, cavernous). Less common is sinus thrombosis, often due to hereditary thrombophilia (Laskov, 2013: 71-7).

Risk factors. Risk factors for stroke during pregnancy are the same as in non-pregnant women; they include arterial hypertension, atherosclerosis, smoking, heart valve diseases, prosthetic heart valves, atrial fibrillation, migraine, systemic connective tissue diseases (Szolnoki, Somogyvari, Kondacs, 2001: 756-61).

Among the factors that increase the incidence of stroke, general risk factors can be identified - these are age (pregnancy and childbirth in the late reproductive period), smoking, a large number of pregnancies and childbirth in history, the presence of comorbid diseases (infectious, somatic, associated with metabolic disorders ) and specific ones, including vasculopathy, embolism, hematological disorders (Table 1).

**Table 1.**

General Risk Factors	Specific Risk Factors
<ul style="list-style-type: none"> <li>• Age of the pregnant woman (senior)</li> <li>• Multiparous</li> <li>• Smoking</li> <li>• Presence of comorbid diseases:               <ul style="list-style-type: none"> <li>– infection;</li> <li>– hypertension;</li> <li>– preeclampsia;</li> <li>– acid-base disturbances.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Vasculopathy:               <ul style="list-style-type: none"> <li>– intracranial aneurysm;</li> <li>– arteriovenous malformation;</li> <li>– venous sinus thrombosis;</li> <li>– dissection of the artery;</li> <li>– atherosclerosis;</li> <li>– vasculitis;</li> <li>– systemic lupus erythematosus;</li> <li>– Tay-Sachs disease;</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>– moyamoya disease;</li> <li>– migraine.</li> <li>• Embolism: <ul style="list-style-type: none"> <li>– fatty or air;</li> <li>– paradoxical;</li> <li>– peripartum cardiomyopathy;</li> <li>– atrial fibrillation;</li> <li>– endocarditis.</li> </ul> </li> <li>• Hematological disorders: <ul style="list-style-type: none"> <li>– sickle cell anemia;</li> <li>– anticardiolipin and lupus anticoagulant;</li> <li>– polycythemia;</li> <li>– mutation of factor V Leiden;</li> <li>– deficiency of protein S, C or deficiency of antithrombin III (AT-III);</li> <li>– antiphospholipid antibodies (APA);</li> <li>– thrombotic thrombocytopenic purpura (TTP).</li> </ul> </li> <li>• Cocaine addiction</li> </ul>
--	--

### Conclusion

Age-the frequency of strokes increases with the age of a pregnant woman – from 30 cases per 100 thousand at the age of up to 20 years to 90.5 per 100 thousand at the age of more than 40 years (Yoshida, Takahashi, Takenobu, 2017: 276-82). The average age of patients with stroke during pregnancy is reported to be 29-30 years and the prevalence of multiparous over nulliparous in a ratio of 2:1. It has been noted that women who gave birth at a later age (after 40 years) have an increased risk of developing hemorrhagic stroke after the end of the gestation period (Akhvlediani, Logutova, Travkina, 2015: 65-71).

Multiparous women have a higher risk of stroke due to older age and the presence of comorbidities. In this group, 2.5 times more often than in other women, there are diseases such as iron deficiency anemia, kidney disease, arterial hypertension, obesity, varicose veins, which create a favorable background for the development of pregnancy complications. In addition, an increased risk may be associated with the often wrong lifestyle, bad habits, prolonged exposure to various stresses and general aging of the body.

### References

1. Say, L., Chou, D., Gemmill, A., Tunchal, O., Moller, A.B., Daniels J. et al. (2014). Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Heal.* 2(6): e323-e333. doi: 10.1016/S2214-109X(14)70227-X
2. Swartz, R.H., Cayley, M.L, Foley, N., Ladhani, N.N.N., Leffert, L., Bushnell, C. et al. (2017). The incidence of pregnancy-related stroke: a systematic review and meta-analysis. *Int J Stroke.* 12(7): 687-697. doi: 10.1177/1747493017723271
3. Cantu-Brito, C., Arauz, A., Aburto, Y., Barinagarrementeria, F., Ruiz-Sandoval, J.L., Baizabal-Carvalho, J.F. (2011). Cerebrovascular complications during pregnancy and postpartum: clinical and prognosis observations in 240 Hispanic women. *Eur J Neurol.* 18(6): 819-825. doi: 10.1111/j.1468-1331.2010.03259.x
4. Leffert, L.R., Clancy, C.R., Bateman, B.T., Bryant, A.S., Kuklina, E.V. (2015). Hypertensive disorders and pregnancy-related stroke. *Obstet Gynecol.* 125(1): 124-131. doi: 10.1097/AOG.0000000000000590
5. Dombrovsky, V.S., Omelyanovsky, V.V. (2014). Problems of choosing outcomes for evaluating the effectiveness of rehabilitation programs for patients after stroke and TBI. *Pharmacoeconomics. Modern pharmacoeconomics and pharmacoepidemiology.* 7(3): 20-5.

6. Gnezditsky, V.V., Korepina, O.S., Karlov, V.A. (2016). Computed EEG and cognitive evoked potentials in elderly patients with aphasia and epilepsy after stroke. *Epilepsy and paroxysmal conditions*. 8(1): 12-21. DOI: 10.17749/2077-8333.2016.8.1.012-021
7. Akhvlediani, K.N., Logutova, L.S., Travkina, A.A. (2015). Ischemic stroke and pregnancy. *Russian Bulletin of an obstetrician-gynecologist*. 15(6): 65-71. DOI: 10.17116/rosakush201515665-71
8. Treadwell, S.D., Thanvi, B., Robinson, T.G. (2008). Stroke in pregnancy and the puerperium. *Postgrad Med J*. 84(991): 238-45. DOI: 10.1136/pgmj.2007.066167
9. Davie, C.A., O'Brien, P. (2008). Stroke and pregnancy. *J Neurol Neurosurg Psychiatry*. 79(3): 240-245. DOI:10.1136/jnnp.2007.116939.
10. Scott, C.A., Bewley, S., Rudd, A. et al. (2012). Incidence, risk factors, management, and outcomes of stroke in pregnancy. *Obstet Gynecol*. 120(2 Pt 1): 318-24.
11. Yoshida, K., Takahashi, J.C., Takenobu, Y. et al. (2017). Strokes associated with pregnancy and puerperium: a nationwide study by the Japan Stroke Society. *Stroke*. 48(2): 276-82. DOI: 10.1161/STROKEAHA.116.014406
12. Laskov, V.B. (2013). Risk factors, mechanisms of development and types of stroke during pregnancy. Possibilities of drug therapy. *Neurology, neuropsychiatry, psychosomatics*. (3): 71-7.
13. Szolnoki, Z., Somogyvari, F., Kondacs, A. et al. (2001). Evaluation of the roles of the Leiden V mutation and ACE I/D polymorphism in subtypes of ischaemic stroke. *J Neurol*. 248(9): 756-61. DOI: 10.1007/s004150170090

Received: 18.11.2022

Accepted: 22.01.2023