

<https://doi.org/10.36719/3104-4700/1/38-45>

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## **Clinical Evaluation of Pregnant Women with Preeclampsia and Children Born by Them**

### **Abstract**

The article provides information about a research study conducted to study the frequency of preeclampsia among pregnant women and its impact on newborns. During the study, 110 pregnant women diagnosed with preeclampsia were observed among 1238 pregnant women. In the study, arterial pressure measurement, general blood analysis, cardiotocography, urine general analysis, 24-hour urine protein determination, liver functional tests, USM, creatine concentration calculation were performed in pregnant women. Pregnant women diagnosed with preeclampsia were divided into 3 groups by age: younger than 20 years old, between 20-35 years old, and older than 35 years old. According to parity, it was divided into nulliparous, multiparous, grandmultiparous ones. A higher risk of preeclampsia was observed in pregnant women aged 35 years and older and in grandmultiparous women. In order to study the effect of preeclampsia on the newborn, 114 newborns (4 of them twins) born from 110 preeclamptic pregnancies were clinically evaluated. Laboratory tests, neurosonography, echocardiography, audiometry, and X-ray examination were performed on newborns whose examination is important. As a result, it was observed that preeclampsia causes intrauterine growth retardation, premature birth, intrauterine hypoxia, low birth weight and low Apgar children, a number of heart, brain and respiratory system problems, and an increase in the frequency of operative completion of childbirth (Ashley et al., 2019).

**Keywords:** *preeclampsia, intrauterine growth retardation, intrauterine hypoxia, low birth weight newborn*

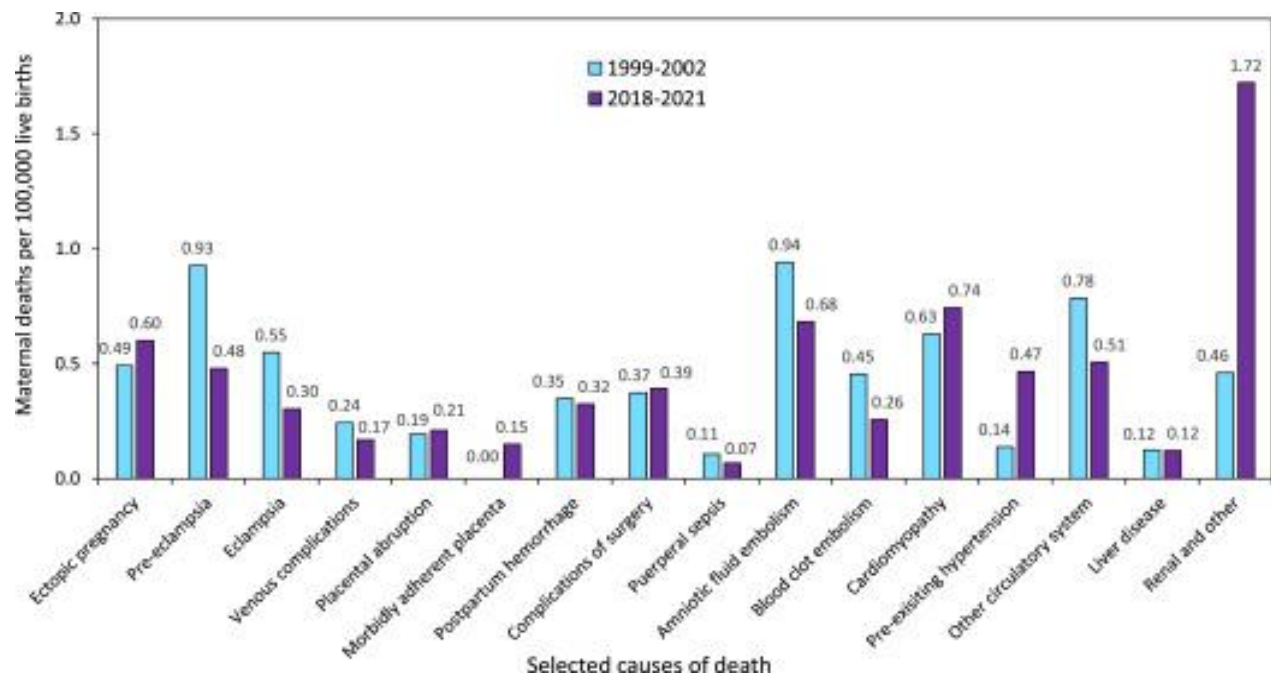
### **Introduction**

Preeclampsia is a specific pregnancy pathology, a syndrome characterized by arterial hypertension, edema, significant proteinuria ( $>0.3$  g/l in daily urine) or signs of dysfunction of one or more organs that develop after the 20th week of pregnancy (Asheber et al., 2011). It affects 2-8 % of all pregnant women. According to the research conducted by the World Health Organization in 2003-2009, among the causes of maternal death, it ranks second with 18 % after hemorrhagic problems, which make up 27.1 %. Compared to 1999-2001, there was a decrease in the number of mothers who died from preeclampsia in 2018-2021 (Joseph et al., 2024). It can lead to lack of an umbilical cord, retardation of intrauterine development of the fetus, increase in the frequency of premature birth and operative delivery. It accounts for 8-10 % of all premature births (Anouk et al., 2016). Although the mechanism of the risk of neurodevelopmental, cardiovascular, brain and metabolic diseases in newborns born to pregnant women with preeclampsia is not fully known, it is possible that the preeclamptic environment has a negative impact on the development process.

### **Research**

Women with antiphospholipid antibody syndrome had the highest pooled rate of pre-eclampsia. Those with prior pre-eclampsia had the greatest pooled relative risk. Chronic hypertension ranked second, both in terms of its pooled rate and pooled relative risk of pre-eclampsia. Pregestational diabetes, prepregnancy body mass index (BMI)  $>30$  and use of assisted reproductive technology were other prominent risk factors (Emily et al., 2016).

Bar Chart 1



Bar Chart 2

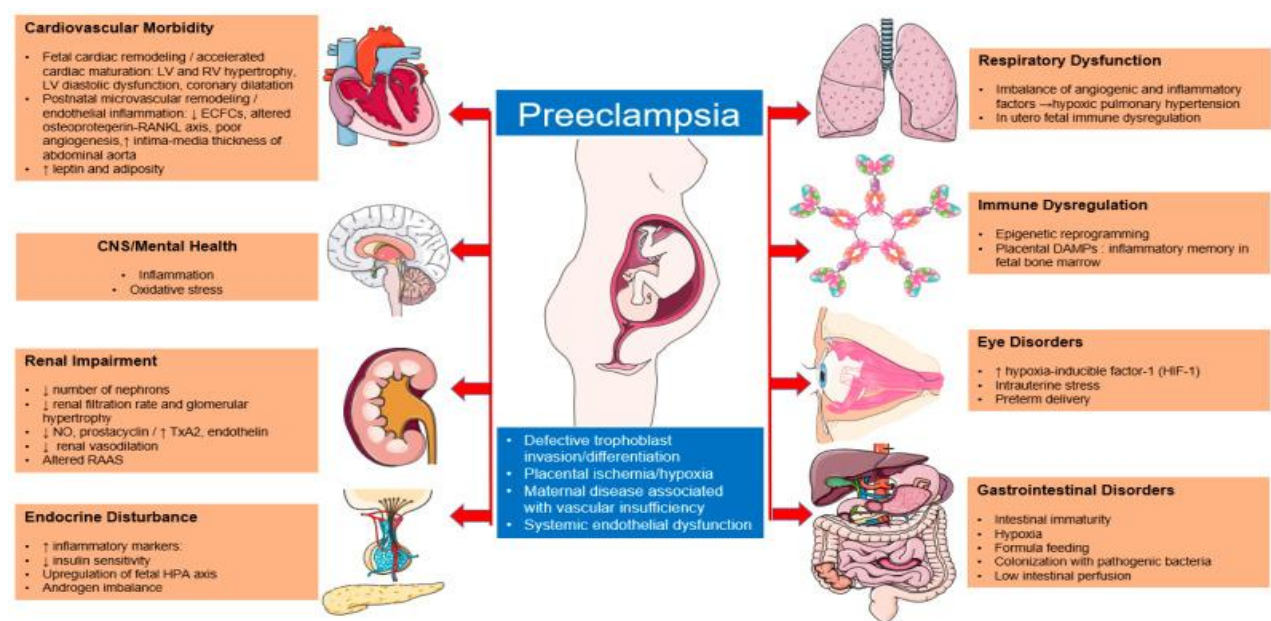


Table 1

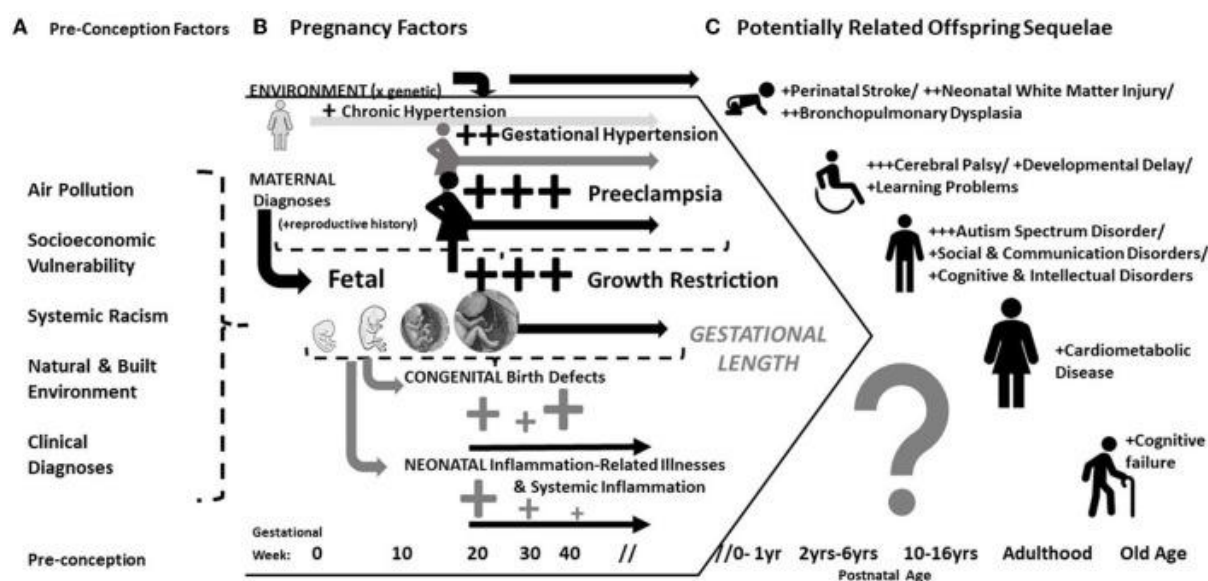
A patient with preeclampsia is diagnosed with "severe preeclampsia" if one or more of the following are present (pre-eclampsia and eclampsia Guideline 2019)

|   |
|---|
| <b>A sharp rise in blood pressure:</b>  |
| SAT ≥160 mmHg twice with an interval of at least 4 hours while the patient is in bed mode or DAT ≥110 mmHg when measured once; Note: in general, antihypertensive therapy should be started on the basis of severe hypertension, which can provide treatment of high AT without waiting 4 hours (Lambert et al., 2014). |
| <b>Symptoms of central nervous system dysfunction:</b>  |
| Symptoms such as newly emerged cerebral or visual disturbances: Photopsia, scotoma (spots), cortical blindness, retinal vasospasm. Severe headache (ie, disabling, “worst headache I’ve ever  |

|  |
|--|
| had") or headache that persists and worsens despite the use of pain relievers and is unexplained by alternative diagnoses.   |
| <b>Liver dysfunction:</b>  |
| Liver dysfunction, unexplained/unrelated to another diagnosis and characterized by serum transaminase concentrations more than 2 times or the upper limit of normal or severe persistent right upper quadrant abdominal or epigastric pain unresponsive to medication. |
| <b>Thrombocytopenia:</b>   |
| <100.000 thrombocyte/microl(dl)  |
| <b>Kidney dysfunction:</b>   |
| Renal failure (serum creatinine >1.1 mg/dl [97.2 micromol/l] or doubling of serum creatinine in the absence of other renal disease).   |
| <b>Pulmonary edema</b>   |

In the absence of other indications (bleeding) to terminate birth urgently, stabilize hemodynamics (AT range: SAT 130-149 mmHg, DAT 80-99 mmHg), relieve headaches, take anticonvulsant measures, intensive treatment is carried out for 12-24 hours in order to increase diuresis. If the patient's condition worsens (blood pressure rises above 170/110 mmHg, headaches intensify, readiness for convulsions and nausea, vomiting, pain in the epigastric region are noted) – the pregnancy should be terminated immediately (Clinical protocol on resuscitation of severe preeclampsia and eclampsia Baku-2009).

Diagram 1



**The purpose of the study:** to study the incidence of preeclampsia among pregnant women and the impact on newborns.

#### Materials and methods of the research

Between 01.10.2023 and 30.06.2024, 1238 pregnant women who gave birth at Nakhchivan MR Perinatal Center were examined. Pregnant women with blood pressure of 140/90 and above and proteinuria of more than 300mg/l in 24 hours at least 2 times with an interval of 4 hours were included in the study.

Measurement of arterial pressure. Patients with a measurement result of 140/90 and above were checked after 4 hours. All patients underwent general blood analysis, cardiotocography, general analysis of urine, determination of the amount of protein in 24-hour urine, functional tests of the liver, USM, calculation of creatine concentration. Arterial pressure 160/110 mmHg and above, liver function test abnormalities, more than 4gr/l Pregnant women with proteinuria, significant

hemolysis and thrombocytopenia, severe epigastric and headache, and visual disturbances were considered as severe preeclampsia. MgSulfate infusion therapy was applied to pregnant women with severe preeclampsia. Neonates were clinically evaluated. Laboratory examinations were carried out. Neurosonography, echocardiography, audiometry, and X-ray examination were performed on newborns whose examination was important.

### Conclusion

Taking into account the relevance of the topic, preeclampsia was diagnosed in 110 out of a total of 1238 patients during the research conducted at the Nakhchivan MR Perinatal Center (Abbasova et al., 2017). The incidence of preeclampsia was determined as 8.88 %.

The average age of all patients who gave birth in our center was 25.48. 14 of them (1.13 %) were under 20 years old, 1156 (93.38 %) were between 20-35 years old, and 68 (5.49 %) were 35 years old and older. 603 (48.71 %) were nulliparous, 609 (49.19 %) were multiparous, and 26 (2.10 %) were grand-multiparous. 654 out of 1238 births (52.83 %) ended operatively.

4 (3.64 %) of pregnant women with preeclampsia were under 20 years old, 82 (74.54 %) were between 20-35 years old, 24 (21.82 %) were over 35 years old. The incidence of preeclampsia according to age groups is shown in Table 2.

**Table 2**  
Frequency of occurrence of preeclampsia according to age groups

| Age group          | Pregnants with preeclampsia | Total pregnant | Frequency of occurring % |
|--------------------|-----------------------------|----------------|--------------------------|
| Below 20 years old | 4                           | 14             | 28.57                    |
| 20-35 years old    | 82                          | 1156           | 7.09                     |
| Above 35 years old | 24                          | 68             | 35.29                    |
| <b>Total</b>       | <b>110</b>                  | <b>1238</b>    | <b>8.88 %</b>            |

Thus, the risk of developing preeclampsia was observed to be statistically high in patients over 35 years of age.

63 (57.27 %) of pregnant women with preeclampsia were nulliparous, 38 (34.55 %) were multiparous, and 9 (8.18 %) were grand-multiparous. The incidence of preeclampsia according to parity is shown in Table 3.

**Table 3**  
Frequency of occurrence of preeclampsia according to parity

| Parity            | Pregnants with preeclampsia | Total pregnant | Frequency of occurrence % |
|-------------------|-----------------------------|----------------|---------------------------|
| Nulliparous       | 63                          | 603            | 10.44                     |
| Multiparous       | 38                          | 609            | 6.23                      |
| Grand-multiparous | 9                           | 26             | 34.61                     |
| <b>Total</b>      | <b>110</b>                  | <b>1238</b>    | <b>8.88</b>               |

Thus, the incidence rate was higher in nulliparous (10.44 %) compared to multiparous (6.23 %). In grandmultipars, due to the small number of patients, it did not have a significant effect on the statistical results.

In preeclamptic patients, 50 of 110 patients (45.45 %) gave birth by normal vaginal route, 60 (54.55 %) by operative route. This result is considered statistically high when compared to all births (Table 4).

**Table 4**

Percentage value of delivery methods in all pregnant women and pregnant women with preeclampsia

| Way of birth | Total births | %     | Pregnants with preeclampsia | %     |
|--------------|--------------|-------|-----------------------------|-------|
| Vaginal      | 584          | 47.17 | 50                          | 45.45 |
| Operative    | 654          | 52.83 | 60                          | 54.55 |

When the patients with preeclampsia were evaluated among themselves, 16 of them were accepted as severe preeclampsia (14.54 %). The operative delivery percentage of pregnant women with severe preeclampsia was 75 % (12), while this value was observed as 51.06 % in mild preeclampsia (Table 5).

**Table 5**

Percentage value of ways to complete delivery depending on the severity of preeclampsia

| Way of birth | Severe preeclampsia | %  | Mild preeclampsia | %     |
|--------------|---------------------|----|-------------------|-------|
| Vaginal      | 4                   | 25 | 46                | 48.94 |
| Operative    | 12                  | 75 | 48                | 51.06 |

Out of 110 pregnant women with preeclampsia, 114 babies were born, including 4 twins. 2 (1.75 %) resulted in intrauterine death of the fetus. Both fetuses were older than 36 weeks and weighed more than 2500 grams. The mother visited our center saying that she did not feel the movements of the fetus. After USM and clinical laboratory examinations, the intrauterine death of the fetus was diagnosed and the pregnancy was terminated by vaginal stimulation.

5 (1.99 %) of preeclampsia pregnancies resulted in early neonatal death of the fetus. One of them was a twin pregnancy, 25-26 weeks old, the first pregnant woman (45 years old), and entered our center with the diagnosis of premature discharge of amniotic fluid. The birth was completed operatively. One of the newborns was 700 grams, the other 800 grams was a girl. Apgar score was 3. Deep prematurity neonates were connected to CPAP and could not be kept alive despite the necessary treatments, they died 5 hours later.

2 patients under 34 weeks, first pregnancy, entered our center with the diagnosis of severe preeclampsia. Due to non-responsiveness to antihypertensive treatments, her delivery was terminated operatively. Children were born, weighing one 1000 grams and the other 1700 grams, with 3-4 points on the Apgar scale. During the X-ray examination, atelectasis was found in one, and areas that did not open in the lung in the other. Early neonatal death occurred 2 days later, despite the necessary treatment.

The other patient was admitted to our center with the diagnosis of 39-40 weeks, fifth pregnancy, premature discharge of amniotic fluid, first stage of birth. The birth was completed operatively. A child was born weighing 2700 grams and rated 1-2 on the Apgar scale. Neurosonography showed parenchymatous hemorrhage in the right front and parietal lobes of the brain, and aspiration pneumonia in the lungs during X-ray examination. He died on the 2nd day of his life despite the necessary treatment.

In total, 2 out of 114 neonates born from 110 preeclamptic pregnancies (1.80 %) twin pregnancies were born before 28 weeks and resulted in early neonatal death. 8 (7.21 %) were born between 28-34 weeks and 2 of them resulted in early neonatal death. 101 (90.99 %) were born older than 34 weeks and 1 of them resulted in early neonatal death and 2 in intrauterine death.

Children born to preeclamptic pregnancies delivered at more than 36 weeks were rated <7 on the Apgar scale at 5 minutes (Table 6).

**Table 6**

Children born to pregnant women with preeclampsia who delivered more than 36 weeks had an Apgar score of less than 7 at minute 5

| Apgar score at minute 5 | In those born to pregnant women with severe preeclampsia | In those born to pregnant women with mild preeclampsia | Total        |
|-------------------------|--|--|--------------|
| <7                      | 4 (36.36 %)  | 28 (32.5 %)  | 32 (34.04 %) |
| >7                      | 7 (63.64 %)  | 55(67.5 %)   | 62 (65.96 %) |
| Total                   | 11   | 83   | 94           |

In 4 (36.36 %) of 11 pregnant women with severe preeclampsia who gave birth after 36 weeks, in 28 (32.5 %) of 83 pregnant women with mild preeclampsia, the Apgar score at the 5th minute was less than 7. Although there was no significant difference, in children born to pregnant women with severe preeclampsia, an Apgar score of less than 7 at the 5th minute was determined to be at higher risk.

When pregnant women with preeclampsia who gave birth after 36 weeks were examined, although there was no significant difference, the risk of birth of children weighing less than 2500 grams was found to be higher in the group of severe preeclampsia compared to those with mild preeclampsia (Table 7).

**Table 7**

The relationship between the degree of preeclampsia and the birth of low birth weight children

| The degree of preeclampsia | Total number of patients | A newborn weighing less than 2500 grams | %     |
|----------------------------|--------------------------|---|-------|
| Severe preeclampsia        | 11                       | 3                                       | 27.27 |
| Mild preeclampsia          | 83                       | 21                                      | 25.30 |
| Total                      | 94                       | 24                                      | 25.53 |

In general, 40 (35.09 %) of 114 newborns born to preeclamptic women were normal; 24 (21.05 %) weigh less than 2500 grams; 32 (28.07 %) had an Apgar score of <7 at the 5th minute; 2 (1.75 %) fetal death in utero; 5 (4.38 %) resulted in early neonatal death. During the research, among the newborns, cyst in the brain (11.40 %), cyanosis (9.64 %), subependymal hemorrhage in the brain (5.26 %), intrauterine hypoxia (5.26 %), subcutaneous hemorrhage (4.38 %), transient tachypnea (3.51 %) , intrauterine growth retardation (3.51 %) was identified as a higher risk than others (Table 8).

**Table 8**

Examination results of newborns born to pregnant women with preeclampsia

| Newborns   | Number | %     |
|--|--------|-------|
| Normal   | 40     | 35.09 |
| Cyst in the brain                                | 13     | 11.40 |
| Cyanosis   | 11     | 9.64  |
| Grade I intraventricular hemorrhage in the brain | 6      | 5.26  |
| Intrauterine hypoxia                             | 6      | 5.26  |
| Subcutaneous hemorrhage                          | 5      | 4.38  |
| Death in the early neonatal period               | 5      | 4.38  |
| Intrauterine growth retardation                  | 4      | 3.51  |

|   |            |      |
|---|------------|------|
| Transient tachypnea   | 4          | 3.51 |
| Intrauterine growth retardation, cyst in the brain, cyanosis                                    | 3          | 2.63 |
| Asymmetric lateral ventricle  | 2          | 1.75 |
| The true knot of the umbilical cord   | 2          | 1.75 |
| Intrauterine growth retardation, atelectasis, I degree intraventricular hemorrhage in the brain | 2          | 1.75 |
| Intrauterine death  | 2          | 1.75 |
| Atelectasis   | 1          | 0.88 |
| Hepatitis   | 1          | 0.88 |
| A cyst in the brain, a true nodule of the umbilical cord  | 1          | 0.88 |
| Mitral valve prolapse, brain cyst, sinus arrhythmia, transient tachypnea                        | 1          | 0.88 |
| Cyst in the brain, transient tachypnea, uni tricuspid   | 1          | 0.88 |
| Grade I intraventricular hemorrhage in the brain, intrauterine growth retardation               | 1          | 0.88 |
| Intrauterine growth retardation, tricuspid valve dystrophy, left ventricular enlargement        | 1          | 0.88 |
| Deficiency of the tricuspid valve   | 1          | 0.88 |
| Respiratory distress syndrome   | 1          | 0.88 |
| <b>Total</b>  | <b>114</b> |      |

Thus, preeclampsia is the most common complication of pregnancy, and if it is not intervened in time, it can lead to acute kidney or liver failure, pulmonary edema, cerebral hemorrhage, widespread intravascular coagulation and eclampsia, and even the death of the mother and child. In newborns, it can cause intrauterine growth retardation, premature birth, low birth weight babies, brain and cardiovascular system, respiratory system, and other problems. This increases the risk of neurodevelopmental, cardiovascular, brain and metabolic diseases in these children in the future. Taking into account all this, it is recommended that pregnant women come to the field obstetrician-gynecologists' examinations from time to time, and children born to preeclamptic women should be under the supervision of a pediatrician.

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Received: 28.09.2024

Revised: 16.10.2024

Accepted: 23.11.2024

Published: 24.12.2024