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# Somatic diseases of the mother and preterm birth

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**ABSTRACT**

**Relevance:** Every year, around 15 million (more than one in 10) babies are born prematurely worldwide, and about 12 million (81.1%) of these preterm babies are born in Asia and sub-Saharan Africa.
**The study aimed to** explore accompanying illnesses in women with preterm birth and to identify a positive correlation between variables.
**Materials and methods:** We conducted a retrospective analysis of prenatal records of 102 women aged 20 to 46 years who received prenatal care at the City Polyclinic No. 32 in Almaty and gave preterm birth from January to August 2022. Pearson's correlation and two-sided value (p-value) with a 95% probability were used for statistical analysis.
**Results:** The analysis revealed that the number of preterm births was more common in expectant mothers aged 20 to 29. As a result of our study, preterm birth is common in pregnant women with iron deficiency anemia, chronic pyelonephritis, obesity, vulvar varicosities, and preeclampsia. Correlations were found between age and number of pregnancies (p = 0.001), age and number of births (p = 0.018), and age and vulvar varicosities (p = 0.041). Vulvar varicosities also depended on the number of pregnancies (p = 0.031) and the number of births (p = 0.019).
**Conclusion:** Risk factors associated with preterm birth are maternal age, number of pregnancies, and number of births. In our study, we detected a total of 19 comorbidities in 102 expectant mothers.

**Keywords:** *Preterm birth, premature babies, correlation, risk factors.*

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# Соматические заболевания матери и преждевременные роды

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**АННОТАЦИЯ**

**Актуальность:** Ежегодно во всем мире около 15 миллионов (более одного из 10) детей рождаются недоношенными, и около 12 миллионов (81,1%) таких недоношенных приходится на Азию и страны Африки к югу от Сахары.
**Цель исследования** – изучение сопутствующих заболеваний у женщин с преждевременными родами и выявление положительной корреляции между переменными.
**Материалы и методы:** Нами проведен ретроспективный анализ обменной карты беременной и родильницы, 102 женщин в возрасте от 20 до 46 лет с преждевременными родами, за период с января по август 2022 года, на базе городской полклиники №32 г. Алматы. Для статистического анализа использована корреляция Пирсона и двустороннее значение (p-value) с вероятностью 95% ДИ.
**Результаты:** Во время анализа выявлено, что количество преждевременных родов чаще встречалось у рожениц от 20 до 29 лет. Согласно нашему исследованию, преждевременные роды часто встречаются у беременных с железодефицитными анемиями, хроническим пиелонефритом, ожирением, варикозным расширением вен половых органов, а также преэклампсией. Выявлены корреляции между возрастом и количеством беременностей (p = 0,001), возрастом и количеством родов (p = 0,018), возрастом и варикозным расширением вен половых органов (p = 0,041). А также варикозное расширение вен половых органов зависело от количества беременностей (p = 0,031) и от количества родов (p = 0,019).
**Заключение:** Факторами риска, связанными с преждевременными родами, являются, возраст матери, количество беременностей и количество родов. Кроме того, по результатам нашего исследования всего у 102 рожениц были определены 19 сопутствующих заболеваний.

**Ключевые слова:** *Преждевременные роды, недоношенные дети, корреляция, факторы риска.*

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# Анасының соматикалық аурулары және мерзімінен ерте туылу

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**АНДАТПА**

**Өзектілігі:** Жыл сайын дүниежүзінде 15 миллионға жуық сәби (10-нан біреуінен көбі) шала туылады және осы шала туған нәрестелердің шамамен 12 миллионы (81,1%) Азия елдері мен Сахараның оңтүстігіндегі Африкада дүниеге келеді.

**Зерттеудің мақсаты** – мерзімінен бұрын босанған әйелдердегі қосымша ауруларды зерттеу және айнымалылар арасындағы оң корреляцияны анықтау.

**Материалдар мен әдістері:** Алматы қаласындағы №32 қалалық емхана базасында 2022 жылдың қаңтар-тамыз айлары аралығында мерзімінен бұрын босанған 20 мен 46 жас аралығындағы 102 әйелдің жүкті және босанушының айырбастау картасына ретроспективті талдау жүргіздік. Статистикалық талдау үшін Пирсон корреляциясы және 95% сенімділік ықтималдығы (СЫ) бар екі жақты мән (p-value) пайдаланылды.

**Нәтижелері:** Талдау барысында мерзімінен бұрын босану жиілігі 20-29 жас аралығындағы босанатын әйелдерде жиі кездесетіні анықталды. Біздің зерттеуіміздің нәтижесінде темір тапшылығы анемиясымен, созылмалы пиелонефритпен, семіздікпен, жыныс мүшелерінің варикозды кеңеюімен және преэклампсиямен ауыратын жүкті әйелдерде мерзімінен бұрын босану жиі кездеседі. Жас пен жүктілік саны (p = 0,001), жас пен туыт саны (p = 0,018), жас пен жыныс мүшелері веналарының варикозды кеңеюі (p = 0,041) арасындағы корреляция анықталды. Сондай-ақ, жыныс мүшелері веналарының варикозды кеңеюуі жүктілік санына (p = 0,031) және босану санына (p = 0,019) байланысты болды.

**Қорытынды:** Мерзімінен бұрын босануға байланысты қауіп факторлары - ананың жасы, жүктілік саны, туыт саны болды. Сонымен қатар, біздің зерттеу нәтижелері бойынша босанушы 102 әйелде барлығы 19 ілеспе ауру анықталды.

**Түйінді сөздер:** *Шала туылу, шала туған нәрестелер, корреляция, қауіп факторлары.*

**Introduction:** Preterm birth occurs before 37 weeks of gestation. However, the threshold of low gestational age, or the age that distinguishes preterm birth from misbirth, varies in different countries. In the US, the preterm birth frequency is 12-13%; in Europe and other mature countries, the frequency of 5-9% is reported. This frequency has increased mostly in industrial countries, for example, from 9.5% in 1981 to 12.7% in 2005 in the US, despite a better knowledge about risk factors and mechanisms related to preterm birth and many public health measures and medical interventions to reduce preterm births [1].

Every year, around 15 million (more than 10%) babies are born premature worldwide. About 12 million (81.1%) of these preterm births occur in Asia and sub-Saharan Africa [2]. More than a million newborns die each year due to prematurity [1]. Preterm birth affects 10.6% of all newborns in North America, followed by 6.2% in Europe, but Africa has the highest rate of preterm birth at 11.9% [3, 4]. The estimated prevalence of preterm births in developing countries (12%) is higher than in developed countries (9%) [5, 6]. The prevalence of preterm births by country varies in different studies, amounting to 5.1% in Iran [7], 5% in Sweden [8], 12% in Nigeria [9], 9.6% in Algeria, and 18,3% in Kenia [10]. In Ethiopia, the reports vary from 4.4% to 25.9% [11-18].

The research in different regions revealed several preterm birth risk factors such as preeclampsia, preterm prelabour rupture of membranes (PPROM), antepartum hemorrhage, low family income, large number of children in the family (≥4), parents' educational status, and rural residence. Other factors increasing the risk of preterm birth are maternal age <20 years, history of stillbirth, history of abortion, history of preterm birth, failure to attend antenatal care, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), anemia, visible congenital anomalies, cesarean section, and chronic diseases [19]. Multiple gestation, maternal cardiovascular diseases, and fetal hydrops also predispose to preterm birth [2].

The Statistical Collection on the Health of the Population of the Republic of Kazakhstan reports 5.5% of preterm births in 2019 and 5.1% in 2020, representing a heavy burden for the family and the state [20]. The relevance of further study of preterm birth problems made the basis for planning and carrying out this scientific work.

**The study aimed to** explore accompanying illnesses in women with preterm birth and to identify a positive correlation between variables.

**Materials and methods:** We conducted a retrospective analysis of prenatal records of 102 women aged 20 to 46 years who received prenatal care at the City Polyclinic No. 32 in Almaty and gave preterm birth from January to August 2022. The women were divided into 3 groups by age: Group I – 20 to 29 years, Group II – 30 to 39 years, and Group III – over 40 years. Group 1 accounted for 24 patients (23.5%), Group II – 54 (53%), and Group III – 24 (23.5%) (Figure 1).

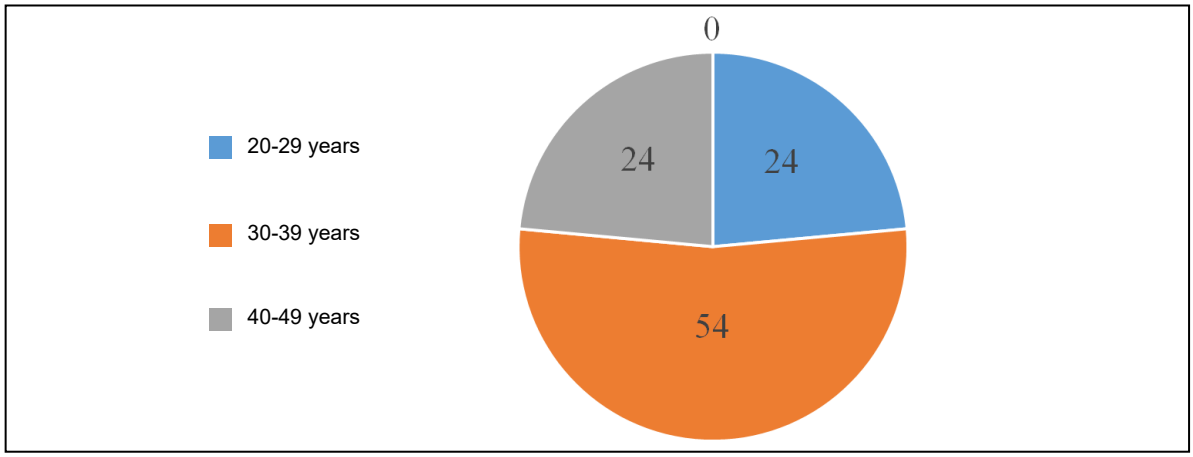


Figure 1 – Number of gravidas by age group (abs.)

The data of 102 patients was accumulated in a Microsoft Excel-based database. We used Pearson correlation and a two-sided p-value with 95% probability for statistical analysis. Statistical analysis was performed using IBM SPSS Statistics 26.

**Results:** We analyzed the quantitative relationships between the total number of previous pregnancies and births, including preterm births. The analysis showed that expectant mothers aged 20-29 had a larger history of preterm births. In Group I, 24 women had 30 pregnancies, which ended in 24 births, including 12 preterm births (50% of all births in this age group).

In Group II (30 to 39 years), 54 women had 132 pregnancies, which resulted in 94 births (70.9% of all pregnancies), including 9 preterm births (9.1% of all births). In the older age group (40 to 49 years), 24 women had 114 pregnancies, which resulted in 72 births (63.2%), with no preterm births (Table 1).

Table 1 – Quantitative analysis of the total number of pregnancies, births, and preterm births (abs.)

| Indicator | 20-29 years (n=24) | 30-39 years (n=54) | 40-49 years (n=24) |
|---|---|---|---|
| No. of pregnancies | 30 | 132 | 114 |
| No. of births | 24 | 94 | 72 |
| No. of preterm births | 12 | 9 | – |

An important and remarkable topic in the study was the identification of concomitant diseases. Figure 2 shows that concomitant diseases in expectant mothers aged 20 to 29 years included multisystem inflammatory syndrome, preeclampsia, chronic gastritis, PPROM, obesity, iron deficiency anemia, chronic pyelonephritis, and arterial hypertension.

Expectant mothers aged 30 to 39 years had such concomitant diseases as liver hemangioma, allergic rhinitis, renal infarction with preeclampsia, cholecystitis, chronic heart failure, obesity, uterine scar, iron deficiency anemia, gallbladder volvulus, chronic pyelonephritis, arterial hypertension, vulvar varicosities, and hysteromyoma.

Notably, older gravidas aged 40 to 49 had fewer concomitant diseases, though the number of women was similar to Group I. They presented hepatitis C, iron deficiency anemia, edema, hypertension, vulvar varicosities, and hysteromyoma.

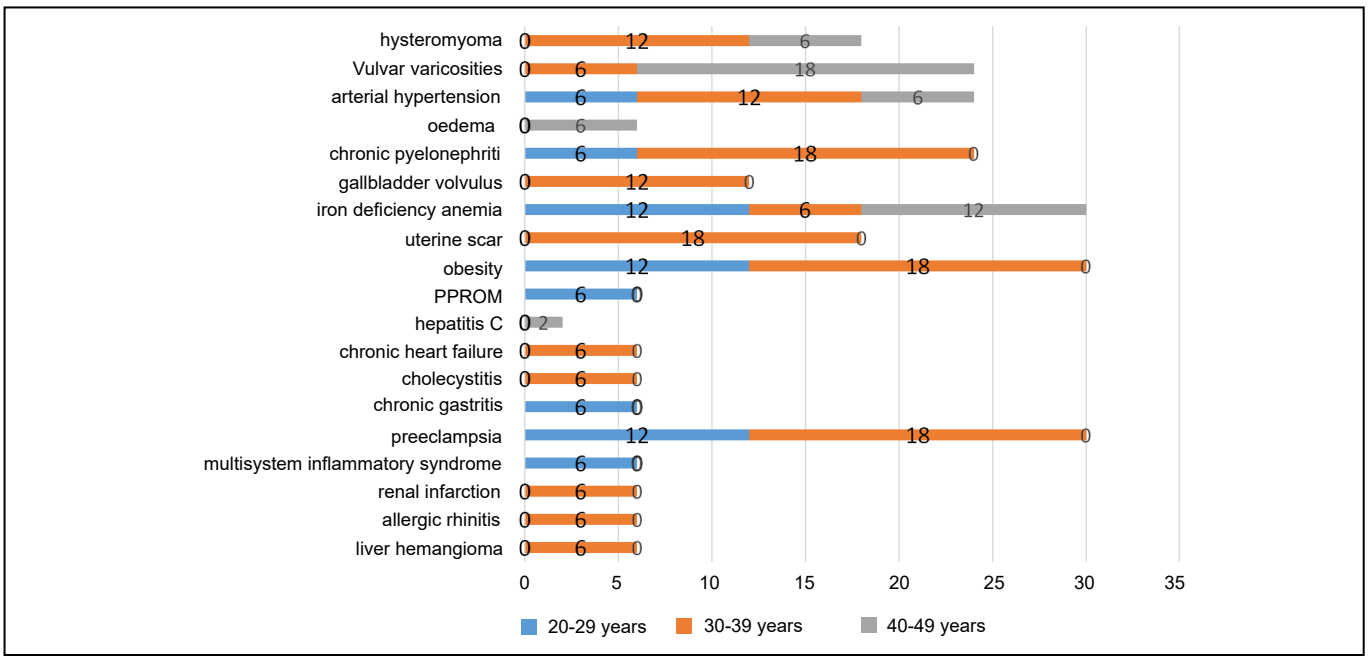


Figure 2 – Concomitant diseases among women in labor (abs.)

Then, we conducted a statistical analysis (Table 2) to determine the Pearson correlation with a two-tailed value [CI 95%].

Table 2 – Correlation analysis by variables

| Variable | Age | | No. of pregnancies | | No. of births | | No. of preterm births | |
|---|---|---|---|---|---|---|---|---|
| | Pearson correlation | Two-tailed value | Pearson correlation | Two-tailed value | Pearson correlation | Two-tailed value | Pearson correlation | Two-tailed value |
| **Age** | | | 0.697** | 0.001 | 0.572* | 0.032 | -0.401 | 0.128 |
| **No. of pregnancies** | 0.698** | 0.001 | | | 0.901** | 0.000 | 0.211 | 0.502 |
| **No. of births** | 0.551* | 0.018 | 0.901** | 0.000 | | | 0.298 | 0.302 |
| **No. of preterm births** | -0.441 | 0.132 | 0.168 | 0.692 | 0.336 | 0.321 | | |
| **Hysteromyoma** | 0.312 | 0.238 | 0.256 | 0.402 | 0.307 | 0.401 | -0.198 | 0.296 |
| **Vulvar varicosities** | 0.586* | 0.041 | 0.565* | 0.031 | 0.552* | 0.019 | 0.018 | 0.938 |
| **Arterial hypertension** | 0.006 | 0.987 | -0.298 | 0.178 | -0.301 | 0.402 | -0.336 | 0.222 |
| **Chronic pyelonephritis** | -0.201 | 0.398 | -0.225 | 0.336 | -0.215 | 0.498 | -0.312 | 0.265 |
| **Oedema** | 0.401 | 0.210 | -0.019 | 0.915 | -0.042 | 0.901 | -0.152 | 0.652 |
| **Gallbladder volvulus** | -0.087 | 0.801 | -0.152 | 0.598 | -0.201 | 0.448 | -0.125 | 0.605 |
| **Iron deficiency anemia** | -0.048 | 0.862 | -0.272 | 0.318 | -0.201 | 0.485 | -0.214 | 0.708 |
| **Uterine scar** | -0.065 | 0.801 | -0.214 | 0.722 | -0.095 | 0.658 | -0.321 | 0.398 |
| **Obesity** | -0.256 | 0.201 | -0.399 | 0.068 | -0.332 | 0.201 | -0.401 | 0.196 |
| **PPROM** | -0.198 | 0.412 | -0.152 | 0.602 | -0.221 | 0.502 | 0.502 | 0.078 |
| **Hepatitis C** | 0.787 | 0.061 | 0.503 | 0.072 | 0.485 | 0.095 | -0.201 | 0.603 |
| **Chronic heart failure** | -0.115 | 0.632 | -0.256 | 0.331 | -0.201 | 0.456 | -0.222 | 0.623 |
| **Cholecystitis** | -0.078 | 0.801 | -0.032 | 0.923 | 0.205 | 0.704 | -0.156 | 0.612 |
| **Chronic gastritis** | -.558* | 0.032 | -0.302 | 0.256 | -0.185 | 0.448 | 0.502 | 0.075 |
| **Preeclampsia** | -0.298 | 0.402 | -0.314 | 0.198 | -0.302 | 0.298 | -0.365 | 0.184 |
| **Multisystem inflammatory syndrome** | -0.236 | 0.401 | -0.269 | 0.305 | -0.221 | 0.398 | -0.145 | 0.632 |
| **Renal infarction** | -0.069 | 0.805 | -0.022 | 0.898 | 0.201 | 0.712 | -0.221 | 0.602 |
| **Allergic rhinitis** | 0.052 | 0.902 | -0.032 | 0.888 | -0.056 | 0.789 | -0.152 | 0.602 |
| **Liver hemangioma** | -0.042 | 0.901 | 0.189 | 0.415 | 0.458 | 0.069 | 0.512 | 0.056 |

In total, we revealed a positive correlation between the age and the number of pregnancies (p = 0.001), the age and the number of births (p = 0.018), and the age and vulvar varicosities (p = 0,041). Vulvar varicosities also depended on the number of pregnancies (p = 0.031) and the number of births (p = 0.019).

**Discussion:** U. Dzhamedinova conducted similar domestic research in Semey (Kazakhstan) [18]. In her study, factors for premature birth of a child were the frequency of births and pregnancy, as well as the sex of the child and the mother's age at menarche. Since preterm birth is a leading cause of death and disability and neurodevelopmental disorders in children under five years of age worldwide, they remain an urgent issue of public health. Premature birth is the most common cause of death in children under five worldwide; however, advancements in technologies and medicine allow

the survival of a growing number of children born right before they become unviable.

Higher survival is associated with a higher probability of long-term neurological disorders. Premature birth, a serious public health problem, affects 15 million babies each year. Research and lobbying by the March of Dimes and other advocacy organizations have focused public attention on preventing preterm birth. Still, there is strong evidence that preterm birth rates are increasing worldwide and in most countries.

Our study also showed that premature birth often occurs in pregnant women with iron deficiency anemia, chronic pyelonephritis, obesity, vulvar varicosities, and preeclampsia. We found correlations of the age with the number of pregnancies ($p = 0.001$), the number of births ($p = 0.018$), and vulvar varicosities ($p = 0,041$). Vulvar varicosities also depended on the number of pregnancies ($p = 0.031$) and births ($p = 0.019$).

**Conclusion:** Foreign studies confirm that preterm birth is an acute issue of public health. Preterm birth risk factors include the maternal age and the number of pregnancies and births. Besides, in our study, we detected a total of 19 comorbidities in 102 expectant mothers. Therefore, public health measures shall be taken to reduce the burden of preterm birth (burden of prematurity) through early detection and treatment of preeclampsia, PPROM, and chronic diseases. The obstetric care providers shall pay proper attention to women.

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