

IDENTIFICATION OF RISK FACTORS INFLUENCING PREGNANCY COMPLICATIONS DEVELOPMENT

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ABSTRACT

Background. According to the WHO, about 830 women die every day worldwide from preventable causes related to pregnancy and childbirth. In the recent years, Kharkiv region remains one of the problematic regions of adverse pregnancy outcomes according to the integrated assessment of the Ministry of Health of Ukraine. Against the backdrop of an unfavorable demographic situation, the problem of researching various aspects of the pregnancy period is becoming more and more urgent. Most of the complications that occur during pregnancy are considered from the side of general medical approaches, including hormonal disorders, infectious complications, immunological disorders, etc.

The aim of the work was to study and assess the influence of risk factors on pregnancy complications.

Materials and Methods. For the study, the pregnant women were distributed into two groups: the Main Group (MG) included 299 pregnant women who had complications during pregnancy, and the Control Group (CG) – 199 pregnant women with a normal pregnancy. The median (minimum; maximum) age was in MG was 32 (21; 44) years, in CG – 31 (24; 45) years ($p>0.05$). The median values of the pregnancy period during the survey were 28 weeks for the MG and 26 weeks for the CG ($p>0.05$).

Results and Conclusions. It was determined that biological, socio-economic and socio-psychological lifestyle factors have the greatest influence. The presence of diseases of the cardiovascular system (including hypertension) and diseases of the genitourinary system in a pregnant woman increased the risk of complications during pregnancy by 31.4 times in MG; and by 23.3 times – in CG. The presence of stress in everyday life and, as a result, the deterioration of the psychological state of the pregnant woman increased the chances of pathology of the course by 42.6 and 40.7 times, respectively. Low financial status of the family increased the risk by 16.5 times.

Keywords: *pathology of pregnancy, preventable deaths of pregnant women, stress.*

INTRODUCTION

Against a background of the ongoing large-scale armed aggression of the Russian Federation against Ukraine, the COVID-19 pandemic, the negative demographic situation in Ukraine is getting worse. The issue of preserving and strengthening reproductive health as an integral component of the population's health is becoming extremely strategic for ensuring the sustainable development of society in general. The health status

of pregnant women remains unsatisfactory. After all, the health of the pregnant women affects the outcome of pregnancy and childbirth, determines the viability of offspring at all stages of ontogenesis, the health of newborns and future generations [1–3].

At present, despite the positive trend, almost every sixth pregnant woman is still diagnosed with anemia, which largely depends on the quality and adequate nutrition, which is caused primarily by the socio-economic status of the family and is a marker of the socio-economic well-being of the country.

The complex environmental situation causes a high frequency with a negative trend of thyroid disease in pregnant women 9.98 per 100 pregnant women in 2018 and 10.6 in 2022. An extremely

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serious problem in Ukraine is the increase in the incidence of diabetes among pregnant women – from 0.62 per 100 pregnant women in 2018 to 1.1 in 2022. There was also a trend towards an increase in the frequency of diseases of the genitourinary system, which is interpreted mainly as a consequence of low reproductive culture and irresponsible sexual behavior – from 13.97 to 14.1 per 100 pregnant women in 2021 and 2022, respectively. Diseases of the genitourinary system are one of the reasons for the development of gestosis in pregnant women, premature discharge of amniotic fluid, impaired reproductive functions of the female body, and increase the risk of perinatal mortality and disability in children. With a positive trend, the frequency of diseases of the circulatory system remains quite high – 7.57 and 6.54 per 100 pregnant women, respectively [4].

Pathology of the course of pregnancy is one of the urgent problems of modern obstetrics and a medical and social problem.

Pregnancy complications development is influenced by many factors, extragenital pathology is one of them. The value of extragenital pathology does not decrease. The steady increase in its frequency is caused by the deterioration of the population's health and the increase in the specific weight of women over 35 years old among pregnant women. The presence of extragenital pathology is a risk factor for up to 20% of maternal and up to 40% of perinatal mortality [5–10].

Current evidence suggests a close relationship between social determinants and pregnancy outcomes. According to the WHO, social determinants are defined as mediated factors between living conditions and access to medical care. The study of determinants that have a reliable influence on the occurrence of pathological pregnancy has an important medical and social significance for the development of preventive measures and improving the quality of medical care for pregnant women at the regional level [11; 12].

The aim of the work was to study and assess the influence of risk factors for pregnancy complications.

Materials and Methods

The study involved 598 pregnant women aged 21–45 who were under hospital treatment or under the supervision of City Maternity Hospital No.1 of Kharkiv City Council and City Clinical Maternity Hospital No.7 of Kharkiv City Council. Two groups were formed: the Main Group (MG), which included 299 pregnant women who had complications during pregnancy, and the Control

Group (CG), which included 199 pregnant women with a normal course. The observation groups were valid for comparison, since the median (minimum; maximum) age of the women of the MG was 32 (21; 44) years, women of the CG – 31 (24; 45) years ($p>0.05$). The study and analysis were carried out by copying the data of accounting medical documentation (individual card of a pregnant woman and a woman giving birth (form 111/0); medical card of an inpatient (form 003/0).

The author's questionnaire was used for the survey ("Questionnaire for the study of risk factors for the occurrence of pregnancy pathology"). The questionnaire contained general questions about age, gender, place of residence, etc. The main domains of the questionnaire regarding risk factors for the development of a pathological course of pregnancy were: level of education, temperament, work activity, psychological state, financial capacity, bad habits, data on the course of pregnancy, somatic diseases, peculiarities of nutrition, rest, activity mode. All pregnant women participated in the study signed the informed consent. When conducting a medical-statistical analysis of the distribution of qualitative and quantitative signs, the presence of reliable differences from the normal nature of the distribution was established. Non-parametric statistical analysis for two independent sample populations Mann-Whitney test was used to compare median values. Fisher's test was used to compare proportions.

To determine risk factors for the occurrence of a pathological course of pregnancy, logistic regression analysis was used with the calculation of the Odds Ratio (OR) of the occurrence of the event according to the z-criterion, and their 95% Confidence Interval (CI) was determined using the program package "MedCalc Software" version 22.023 (MedCalc Software Ltd, Belgium). The difference in the parameters of the table was considered statistically significant at $p<0.05$ and if the CI did not contain "1".

The median values of the pregnancy period during the survey were 28 weeks for the main group and 26 weeks for the control group ($p>0.05$).

Results and Discussion

As a result of the research, the factors that have a significant impact on the occurrence of complications during pregnancy were identified. They were distributed into four groups: medical and biological (these include the presence of extragenital pathology and obstetric and gynecological his-

tory), lifestyle factors: social, socio-economic and socio-psychological.

During the analysis of the presence of extra-genital pathology in pregnant women who participated in the study, it was found that the following had a significant impact on the course of pregnancy: cardiovascular diseases (OR=31.4 95% CI 4.2–230.1, p=0.0007); kidney disease (OR=23.3, 95% CI 3.1–171.1, p=0.0020); thyroid disease (OR=14.3, 95% CI 3.4–60.1, p=0.0003); somatoform autonomic dysfunction (OR=4.0, 95% CI 2.3–6.8, p=0.0001) (Table 1).

In the process of studying the factors of obstetric and gynecological history, it was established that the physiological course of pregnancy was characteristic of women with the first pregnancy, that is, complicated pregnancy is characteristic of the second and subsequent pregnancies (p<0.05).

Previous cesarean deliveries (OR=3.2) and a history of medical abortions (OR=1.8) complicate the course of pregnancy. The presence of menstrual cycle disorders in the gynecological history increases the risk of abnormal pregnancy by 8.2 times (OR=8.2, 95% CI 5.4–12.4, p=0.0001) (Table 2).

The analysis of lifestyle risk factors, which can potentially influence the occurrence of pathology during pregnancy in women, allowed us to identify several of them. Pregnant women of the MG drank coffee (more than one cup per day) 10.4 times more often during pregnancy compared to pregnant women with a physiological course (OR=10.4, 95% CI 1.3–79.8, p=0.0236). The presence of harmful habits in the child's father 10.5 times increases the risk of disorders during pregnancy. Non-compliance with the diet, especially

Table 1. Extragenital pathology in examined pregnant women

| Disease | Output data (pregnant women) | | | | OR | 95% CI | p |
|---|------------------------------|-----|----|-----|------|-----------|--------|
| | a | b | c | d | | | |
| Diseases of the cardiovascular system (including arterial hypertension) | 41 | 258 | 1 | 198 | 31.4 | 4.2–230.1 | 0.0007 |
| Diseases of the respiratory tract | 15 | 284 | 6 | 193 | 1.7 | 0.6–4.4 | 0.2813 |
| Somatoform autonomic dysfunction | 89 | 210 | 19 | 180 | 4.0 | 23.0–6.8 | 0.0001 |
| Diabetes | 7 | 292 | 1 | 198 | 4.7 | 0.5–38.8 | 0.1467 |
| Disease of the thyroid gland | 38 | 261 | 2 | 197 | 14.3 | 3.4–60.1 | 0.0003 |
| Kidney disease | 35 | 264 | 1 | 198 | 23.3 | 3.1–171.1 | 0.0020 |
| Infections of the urinary system | 17 | 282 | 8 | 191 | 1.4 | 0.6–3.4 | 0.4067 |
| Others | 16 | 238 | 1 | 198 | 11.1 | 1.4–85.1 | 0.0001 |

Notes: a – women with a complicated pregnancy and the presence of a symptom; b – women with complicated pregnancy and absence of symptoms; c – women with physiological pregnancy with the presence of a sign; d – women with physiological pregnancy and absence of a sign.

Table 2. Risk factors obstetric and gynecological history of complicated pregnancy

| Obstetric history | Output data (pregnant women) | | | | OR | 95% CI | p |
|----------------------------------|------------------------------|-----|-----|-----|-----|----------|--------|
| | a | b | c | d | | | |
| First pregnancy | 90 | 209 | 110 | 89 | 0.3 | 0.2–0.5 | 0.0001 |
| Cesarean section | 62 | 237 | 15 | 184 | 3.2 | 1.7–5.8 | 0.0001 |
| Premature birth | 13 | 286 | 4 | 195 | 2.2 | 0.7–6.9 | 0.1696 |
| Miscarriages | 27 | 272 | 9 | 190 | 2.0 | 0.9–4.5 | 0.0620 |
| Medical abortions | 76 | 223 | 31 | 168 | 1.8 | 1.1–2.9 | 0.0094 |
| Missed abortion | 27 | 282 | 10 | 189 | 1.8 | 0.8–3.8 | 0.1205 |
| Violation of the menstrual cycle | 213 | 86 | 46 | 153 | 8.2 | 5.4–12.4 | 0.0001 |

Notes: a – women with a complicated pregnancy and the presence of a symptom; b – women with complicated pregnancy and absence of symptoms; c – women with physiological pregnancy with the presence of a sign; d – women with physiological pregnancy and absence of a sign.

the use of fast food and insufficient amount of fruit, has an effect on the course of pregnancy (OR=6.2, 95% CI 4.1–9.2, p=0.0001) and (OR=6.0, 95% CI 3.6–9.9, p=0.0001) respectively (Table 3).

During the investigation, a reliable influence of stress in everyday life and, as a result, the occurrence of a depressed emotional state in a pregnant woman on the occurrence of pregnancy complications was revealed in 42.6 and 40.7, respectively (OR=42.6, 95% CI 5.8–311.0, p=0.0002); (OR=40.7, 95% CI 5.5–297.1, p=0.0003). The dependence of the course of pregnancy on marital status was revealed, an unmarried woman is 4.4 times more likely to have a complicated course of pregnancy (OR=4.4, 95% CI 2.7–7.1, p=0.0001). A low level of income 16.5 times increased the

risk of pregnancy complications (OR=16.5, 95% CI 3.9–69.1, p=0.0001) (Table 4).

Other authors' studies have also assigned an important role to extragenital pathology in the occurrence of pregnancy complications. The key place among which is occupied by cardiovascular diseases, endocrine disorders, systemic damage of connective tissue, etc. Scientists distinguish various factors that determine complications of pregnancy: environmental, psychological, social, etc. Among the peculiarities of the psychological state of the pregnant woman, which affect the development of the child, the following are noted: stress, depressive states, psychopathological features, their occurrence and exacerbation in different periods of pregnancy. Thus, our results are consistent with those of other authors.

Table 3. Social risk factors (lifestyle)

| Risk factor | Output data (pregnant women) | | | | OR | 95% CI | p |
|--------------------------------------|------------------------------|-----|-----|-----|------|----------|--------|
| | a | b | c | d | | | |
| Smoking before pregnancy | 27 | 272 | 6 | 193 | 3.1 | 1.2–7.8 | 0.0118 |
| Harmful habits of the child's father | 173 | 126 | 24 | 176 | 10.5 | 6.4–17.1 | 0.0001 |
| Non-compliance with the diet | 178 | 121 | 67 | 122 | 2.8 | 1.9–4.2 | 0.0001 |
| Regular consumption of fast food | 202 | 97 | 50 | 149 | 6.2 | 4.1–9.2 | 0.0001 |
| Infrequent fruit consumption | 128 | 171 | 22 | 177 | 6.0 | 3.6–9.9 | 0.0001 |
| Coffee consumption | 15 | 284 | 1 | 198 | 10.4 | 1.3–79.8 | 0.0236 |
| Low physical activity | 256 | 36 | 145 | 54 | 2.2 | 1.4–3.4 | 0.0005 |

Notes: a – women with a complicated pregnancy and the presence of a symptom; b – women with complicated pregnancy and absence of symptoms; c – women with physiological pregnancy with the presence of a sign; d – women with physiological pregnancy and absence of a sign.

Table 4. Socio-economic and socio-psychological risk factors

| Risk factor | Output data (pregnant women) | | | | OR | 95% CI | p |
|---|------------------------------|-----|----|-----|------|-----------|--------|
| | a | b | c | d | | | |
| Stress in everyday life | 53 | 246 | 1 | 198 | 42.6 | 5.8–311.0 | 0.0002 |
| Choleric personality temperament type | 132 | 167 | 78 | 121 | 1.2 | 0.8–1.7 | 0.2734 |
| Holding a management position at work | 38 | 261 | 11 | 188 | 2.4 | 1.2–4.9 | 0.0103 |
| Lack of higher education | 59 | 240 | 26 | 173 | 1.6 | 0.9–2.6 | 0.0542 |
| Low level of material condition | 43 | 256 | 2 | 197 | 16.5 | 3.9–69.1 | 0.0001 |
| Marital status (single) | 123 | 176 | 27 | 172 | 4.4 | 2.7–7.1 | 0.0001 |
| Psychological (depressive) state during pregnancy | 51 | 248 | 1 | 198 | 40.7 | 5.5–297.1 | 0.0003 |

Notes: a – women with a complicated pregnancy and the presence of a symptom; b – women with complicated pregnancy and absence of symptoms; c – women with physiological pregnancy with the presence of a sign; d – women with physiological pregnancy and absence of a sign.

Conclusions

1. Our findings allowed identification of risk factors, which, according to the calculation, have the greatest impact on the occurrence of pregnancy complications; they were divided into biological and lifestyle factors. Lifestyle factors are divided into three categories: social, socio-economic, and socio-psychological.

2. Our findings suggest that the most influential biological factor is the presence of extragenital pathology, such as the presence of cardiovascular diseases, including hypertension increases the risk of pregnancy complications 31.4 times, kidney diseases 23.3 times, thyroid disease 14.3 times, and the presence of other diseases 11.1 times.

3. When studying the obstetric and gynecological anamnesis, there was a tendency to have complications during the course of the second and subsequent pregnancies. Violations of the menstrual cycle in the history 8.2 times aggravate the prognosis of pregnancy. Previous cesarean delivery, premature births, miscarriages, and medical abortions also have adverse consequences (OR=3.2; OR=2.2; OR=2.0, respectively).

4. The social factors of the lifestyle include the presence of bad habits in the child's father (OR=10.5), drinking more than 1 cup of coffee per day (OR=10.4), non-compliance with the diet, and especially the use of fast food (OR=6.2), the presence of harmful habits before pregnancy in the mother.

5. The socio-economic and socio-psychological factors include the presence of stress in everyday life, which in turn has an impact on the psychological state of the pregnant woman, increases the risk of pathology during pregnancy (OR=42.6 and OR=40.7, respectively). A low level of financial status also increases 16.5 times the risk of pregnancy complications. Unmarried women had 4.4 times more complications during pregnancy than women with a normal course.

6. Identification of risk factors for pregnancy pathology is important for the development of effective measures for early detection and prevention of these complications.

DECLARATIONS:

Disclosure Statement

The authors have no potential conflicts of interest to disclosure, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included.

Data Transparency

The data can be requested from the authors

Statement of Ethics

The authors have no ethical conflicts to disclose.

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Consent for publication

All authors give their consent to publication.

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