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Article

Identification of a Risk Group For Gestational Hypertension in Pregnant Women Using a Questionnaire Method

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Abstract: Gestational arterial hypertension (GH) complicates 6–8% of pregnancies and remains one of the leading causes of maternal and perinatal morbidity and mortality worldwide. Early identification of pregnant women at risk for GH is therefore a key component of preventive obstetric care. The aim of this study was to identify a risk group for the development of gestational hypertension using a questionnaire-based screening method and to justify its inclusion in routine antenatal care. A total of 957 pregnant women registered for childbirth at the 3rd family polyclinic in Urgench city were examined. The assessment was based on a structured questionnaire consisting of two sections that included demographic data and major risk factors for gestational hypertension. In addition, hemoglobin concentration, blood pressure parameters, body weight gain, and subjective symptoms were evaluated. Based on the total score obtained, pregnant women were stratified into low-, moderate-, and high-risk groups for GH development. The results demonstrated that 17.7% of the examined women belonged to the risk group for gestational hypertension, with 9.1% classified as having a high probability of GH development. High attributable and relative risk values were associated with excessive body weight gain in the first trimester (>3 kg), elevated hemoglobin concentration (>120–130 g/L), absence of a physiological decrease in diastolic blood pressure, and sleep disturbances. The development of gestational hypertension was found to significantly influence pregnancy outcomes and delivery methods, being associated with a higher frequency of obstetric complications and operative deliveries. The findings confirm the effectiveness of the questionnaire-based approach for early identification of pregnant women at increased risk of gestational hypertension. Implementation of this screening tool in routine antenatal practice may contribute to timely preventive measures and reduction of adverse maternal and perinatal outcomes.

Keywords: Blood Pressure; Gestational Hypertension; Pregnant Women; Questionnaire Method.

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1. Introduction

Gestational arterial hypertension occurs in 6-8% of pregnancies and is one of the leading causes of maternal mortality worldwide. In 20-25% of cases, it is the cause of perinatal mortality. Preeclampsia occupies a special place in this context, with its frequency ranging from 2 to 8%. Globally, 10-15% of all maternal mortality cases are associated with preeclampsia or eclampsia, accounting for at least 70,000 deaths annually[1]. Hypertensive disorders during pregnancy cause severe morbidity and disability in mothers and their children. Preventive medicine in this area is considered a priority because early identification of risk groups for gestational hypertension represents a controllable condition[2]. This can prevent many perinatal and maternal losses.

The aim is to identify a risk group of pregnant women for the development of gestational hypertension through questionnaires, for subsequent addition to the standard set of antenatal care measures.

2. Methodology

957 pregnant women who registered for childbirth at the 3rd family polyclinic in Urgench city were surveyed.

The questionnaire consists of 2 parts. The first part includes 14 questions, the second part - includes 6 questions related to the main risk factors for the development of gestational arterial hypertension. According to the questionnaire data, in pregnant women, in addition to the passport part, the presence of hemoglobin concentration was considered, blood pressure/blood pressure was measured[3]. The group of pregnant women who scored a minimum score of 0-5 formed a group with a low probability of developing hypertensive complications. 6-9 points constituted the group with an average probability of developing gestational hypertension, and 9 points or more constituted the group with a high probability of developing gestational arterial hypertension.

An analysis of the questionnaire indicators of 957 pregnant women aged 17 to 28 years was conducted, the average age of women was 24.3±4.22 years. It was established that the largest number of women were 21-25 years old (557 women; 58.3%). The lowest number of women were aged 26 and older, comprising 17.2% (165 women). 235 women (24.5%) were in the 17-20 age group[4,5].

First-time mothers accounted for 52.1% (498 cases). 30.9% (297 women) had a history of secondary parity, in other cases, women had 3 or more births (13.7% (131) and 3.3% (31), respectively). When analyzing the social status of the surveyed women, we found that 56.1% (535 women) were housewives, in the remaining cases, they were workers or employees (11.5%; 112 women and 24.3% 232 women, respectively), a small number of women were institute students (8.1%; 78 women). Only 21.2% (203 women) had higher education, in the remaining cases - secondary (78.8%; 754 women)[6,7,8].

The gestational age at initial registration was 14 weeks in most cases (38.0%, 363 women). Before 13 weeks, 24.0% (229 women) were registered; before 12 weeks - 22.1% (212 women); before 11 weeks and between 7-10 weeks - 8.1% (78 women) and 7.8% (75 women), respectively.

The analysis of the results obtained using the gestational hypertension (GH) development probability assessment scale is presented in Table 1.

The average score indicators on the scale are presented in Table 2. As shown in the table, the mean score on the scale was 6.74±0.14 points.

3. Results and Discussion

Analysis of blood hemoglobin concentration revealed that in most women, hemoglobin levels were within 110-120 g/l, which is normal for pregnant women (42.8%), with an average of 116.5±1.1 g/l. In 16.8% of women, hemoglobin decreased to an average of 107.5±1.8 g/l. In 22.6% of women, hemoglobin averaged 123.6±1.9 g/l. In 17.7% of women, hemoglobin levels were elevated, averaging 138.4±2.1 g/l.

Table 1. The obtained results on the gestational hypertension development probability assessment scale (in points)[9].

Questions	0 points		1 point		2 points	
	Abs.	%	Abs.	%	Abs.	%
Hemoglobin concentration	403.	42.0	383.	40.3	171.	17.7
Absence of physiological drop in diastolic blood pressure	608.	63.4	181.	19.1	168.	17.5

Body weight gain	409.	42.6	308.	32.0	240.	25.4
Presence of headaches	646.	67.4	155.	16.2	156.	16.4
Sleep disturbance	438.	45.8	369.	38.5	150.	15.7
Subjectively:						
Sleep quality	488.	51.0	308.	32.4	161.	16.6
Increased sleep latency	338.	35.3	431.	45.1	188.	19.6
Daytime drowsiness	91.	9.5	640.	66.9	226.	23.6
Irritability	551.	57.4	257.	27.2	149.	15.4

The absence of a physiological decrease in diastolic blood pressure during the first trimester of pregnancy compared to pre-pregnancy indicators is presented in Table 3. As shown in the table, 38.3% of pregnant women have average diastolic blood pressure readings of 62.3±1.1 mmHg, 42.6% have 77.8±1.3 mmHg, and 19.0% have 91.5±1.5 mmHg.

The absence of a physiological decrease in diastolic blood pressure compared to pre-pregnancy values during the first trimester of pregnancy indicates an increased likelihood of gestational hypertension development.

Table 2. Average points on the gestational hypertension development probability scale[10].

Questions	**Average score**
Hemoglobin concentration	0.77±0.019
Absence of physiological decrease in diastolic blood pressure	0.55±0.02
Body weight gain	0.85±0.021
Presence of headaches	0.52±0.02
Sleep disturbance	0.73±0.02
Subjectively:	
Sleep quality	0.68±0.02
Increased sleep latency	0.87±0.19
Daytime drowsiness	1.17±0.014
Average score for subjective questions	2.71±0.043
Irritability	0.62±0.02
Total score	6.74±0.14

Table 3. Distribution of examined pregnant women depending on the level of diastolic blood pressure[11].

DBP level	**Number of examined women**		**Average indicators**
	Abs.	**%**	**(mm.Hg.)**
60-69 mm Hg	367.	38.3	62.3±1.1
70-79 mm Hg	408.	42.6	75.8±1.3
<80 mm Hg	182.	19.0	83.5±1.5

In our studies, excessive weight gain was recorded in 187 women, with their average weight gain being 3.8±0.8 kg. In 559 women, the average weight gain was 2.5±0.6 kg. In the remaining cases - 211 women - the average weight gain was 1.6±0.3 kg.

Many women experience headaches of various causes, and during pregnancy, these can intensify and become more frequent. In our studies, 225 women (23.5%) reported headaches, of which 153 women (15.8%) experienced infrequent headaches and 77 (7.7%) had frequent headaches.

Sleep disturbances were reported by 456 women, which constituted 47.7%. Analysis of subjective sleep data revealed disturbances in 286 pregnant women, representing 62.8%.

Daytime drowsiness was noted by 331 women - 72.7%. The average sleep disturbance score was 0.68±0.02 points[12].

Irritability was reported by 407 (42.6%) pregnant women, of which 225 (23.5%) experienced it rarely, and 182 (19.0%) frequently.

As a result of the survey, we established the following results: the low probability of developing GH was 4.44±0.02 points, the average probability of developing GH was 6.8±0.03 points, and the high probability of developing GH was 10.2±0.1 points (Table 5). The percentages for low, average, and high probability were 82.3%, 8.6%, and 9.1% respectively.

Thus, the risk group included 169 women who scored more than 6 points on the GH development probability scale, which in percentage terms was 17.7%. To demonstrate the influence of the identified risk factors, we conducted attributable and relative risk calculations among 786 women not included in the risk group for the development of GH and 169 from the risk group.

Table 4. Indicators of the probability of gestational hypertension development among the examined women[13].

Assessment of gestational hypertension development probability	Number of examined women (n=957)		Average score
	Absolute	%	
Low probability of GG development	788.	82.3	4.44±0.02
Medium probability of GG development	83.	8.6	6.8±0.03
High probability of GG development	86.	9.1	10.2±0.1

Note: * - P<0.05 - significance of data between groups.

The attributable risk indicator (AR) (Fletcher R., 1998) was calculated using the formula: AR = (OR-1) /OR, and the odds ratio (OR) (Kelmanson I.A., 2004) was calculated as: OR = ad/bc, where a is the number of observations exposed to the studied factor and at risk of developing gestational hypertension; b is the number of observations exposed but not at risk of developing GH; c is the number of observations not exposed but at risk of developing GH; d is the number of observations not exposed and not at risk of developing GH.

Based on the obtained results, we established that high indicators of attributable risk (0.91) and odds ratio (11.58) were observed when body weight gain exceeded 3 kg in the 1st trimester (Table 5).

Additionally, a very high risk of GH development was associated with hemoglobin concentration above 120-130 g/l (0.90 and 9.32 respectively). High indicators of attributable and relative risk were also established in the absence of a physiological decrease in diastolic blood pressure (0.89 and 8.65 respectively).

Table 5. Quantitative assessment of the relationship between risk factors and the development of GH[14].

Risk factor	Attributive risk	Relative risk coefficient
Hemoglobin concentration above 120-130 g/l	0.90	9.32
Absence of physiological decrease in diastolic blood pressure	0.89	8.65
Growing in body weight inover 3 kg in 1 trimester	0.91	11.58
Presence of headaches	0.34	0.75
Sleep disturbance	0.88	8.17

Subjectively:		
Sleep quality	0.82	6.31
Increased sleep latency	0.77	4.41
Daytime drowsiness	0.79	6.05
Irritability	0.69	4.86

High indicators were also observed in both objective and subjective sleep disturbances.

Thus, based on the obtained results, we demonstrated the feasibility of using a scale for assessing the likelihood of gestational hypertension development in pregnant women during the first trimester.

To prove the effectiveness of the developed questionnaire, 169 pregnant women at risk for GH development (main group) and 20 practically healthy pregnant women (control group) were selected from the entire initial group of women. Additionally, in the first and second trimesters, special laboratory and instrumental studies were conducted to address the tasks set in the work, which are described in detail in the research methods section.

The control group, selected in outpatient settings during the first trimester, consisted of pregnant women with no history of risk factors for pregnancy and childbirth complications (acute and chronic gynecological, hereditary, or extragenital diseases).

A comparative analysis of the obtained data was conducted among 3 groups. The first group - the main group - consisted of 119 women from the risk group who developed GH after 20 weeks of gestation. The comparison group consisted of 148 pregnant women from the risk group who did not develop GH after 20 weeks of gestation. The control group consisted of 20 practically healthy pregnant women.

During dynamic observation of 169 women in the risk group, 76 were diagnosed with gestational hypertension, which constituted 7.9% of the total sample of pregnant women and 44.6% of women in the risk group.

Pregnant women with GH formed the main group, while 93 women from the risk group for GH development formed the comparison group. 20 pregnant women with a physiological course of gestation served as the control group.

In pregnant women with GH, the condition first manifested at 22-24 weeks of gestation in 13.4% (16), at more than 24-26 weeks in 23.5% (28), and in 67.2% (80) after 26 weeks of gestation.

Thus, the manifestation of GH in most cases is observed at 22-24 weeks of gestation.

When analyzing blood pressure levels, the following pattern was established: in 25 pregnant women - systolic blood pressure (SBP) ≥140 and diastolic blood pressure (DBP) ≥ 90 mm Hg (average values were - SBP 133.4±2.3 mm Hg; DBP - 85.3±1.6 mm Hg), in 30 pregnant women, the level of SBP was 140-150 mm Hg, and DBP - 90-100 mm Hg (average values 152.4±3.6 mm Hg and 96.8±2.1 mm Hg respectively) (Table 6).

The highest blood pressure values were found in 21 pregnant women, with SBP ranging from 150-160 mmHg, and DBP from 101-110 mmHg (average values - 157.2±3.1 and 109.4±1.6 mmHg, respectively).

Table 6. Blood pressure measurements in pregnant women with gestational hypertension (n=76)[15].

AD	**Number of pregnant women**		**Average indicators (mm Hg)**	
	Abs.	**%**	**GARDEN**	**DAD**
SAB < 140, DBP < 90 mm Hg.	25.	32.8	133.4±2.3	85.3±1.6

SAB 140-150 mmHg, DBP - 90-100 mmHg.	30.	39.5	152.4±3.6	96.8±2.1
SAB 150-160 mmHg, DBP - 101-110 mmHg.	21.	27.7	157.2±3.1	109.4±1.6

Note: * - P<0.05 - significance of data between the main group and the comparison group.

55.5% (42) of women with gestational hypertension were hospitalized, while 44.5% of pregnant women received outpatient treatment. In the comparison group, 18.9% were hospitalized due to the risk of preterm birth.

Pregnant women with gestational hypertension had a high frequency of various obstetric, perinatal, and postnatal complications: 26.1% had fetal growth restriction syndrome (11), 11.8% had preterm birth (5), 2.5% had premature placental abruption (1), 13.4% (6) had fetal and neonatal hypoxia, 18.5% (7) had fetal hypotrophy, and 38.6% (16) had premature rupture of membranes.

No complications were observed in the control and comparison groups.

In subsequent follow-up during the third trimester, 16.8% of pregnant women from the main group developed recurrent gestational hypertension. Such complications were not noted in the comparison group.

For hypertensive disorders caused by the gestational process, pregnancy ended with term delivery in 74.9% of those examined, and with preterm delivery in 35.1% (16). Hypertensive disorders are characterized by a high rate (38.7%) of surgical delivery (Table 7).

Table 7. Frequency of operative deliveries among pregnant women.

Groups	**Physiological childbirth**		**Cesarean section**	
	Abs.	**%**	**Abs.**	**%**
Control Group (n=20)	20.	100.	-	-
Comparison group (n=93)	78.	84.5±1.5	15.	15.5±1.5
Main group (n=76)	29.	38.7±1.9	47.	61.3±1.9*

Note: * - P<0.05 - significance of data between the main group and the comparison group.

Cesarean section in the main group was performed in 14.3% of cases with severe preeclampsia. In 29 pregnant women (24.4%) of the main group, cesarean section was performed due to premature rupture of amniotic membranes, uterine scar deficiency, and cephalopelvic disproportion. In the comparison group, 15.5% of pregnant women experienced premature rupture of amniotic membranes, uterine scar deficiency, and fetal distress. In the control group, no surgical deliveries were observed.

Thus, the presence of gestational hypertension in the main group often leads to unfavorable outcomes (45.4%) for both the mother and the fetus. In the comparison group, i.e., women who scored high on the GH detection scale, unfavorable outcomes were also recorded, but at a lower percentage (26.4%).

Thus, as a result of the conducted survey, it was established that 17.7% of pregnant women have a probability of developing GH, of which 9.2% had a high risk of developing this pathology. The frequency of GH development was 48.2%.

The development of GH had a direct impact on pregnancy outcomes and delivery methods. All this underscores the relevance of the problem, the need to search for new approaches to treatment methods, and to develop measures to prevent complications of gestational hypertension in pregnant women.

4. Conclusion

This study confirms that a questionnaire-based screening approach is an effective and practical method for early identification of pregnant women at risk of gestational hypertension. Among 957 examined women, 17.7% were classified as being at increased risk, and gestational hypertension subsequently developed in nearly half of this group, most often at 22–24 weeks of gestation. The strongest predictors of gestational hypertension were excessive weight gain in the first trimester, elevated hemoglobin concentration, absence of a physiological decrease in diastolic blood pressure, and sleep disturbances. Gestational hypertension was associated with a higher frequency of obstetric complications and operative deliveries. The proposed screening tool can be recommended for routine antenatal care to improve early risk stratification and prevention of adverse maternal and perinatal outcomes.

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