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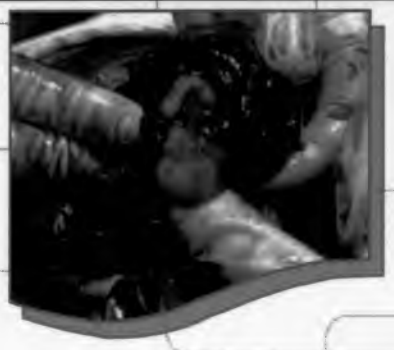

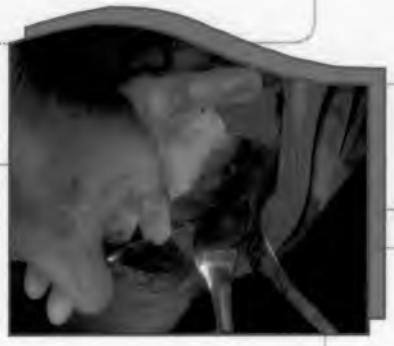

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Research Paper
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RISK FACTORS OF GESTATIONAL DIABETES IN WOMEN OF TRANSCARPATHIAN REGION OF UKRAINE

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Abstract

Introduction: *Women with gestational diabetes mellitus (GDM) have a higher risk of pregnancy complications. Often this disease is diagnosed very late, for timely diagnosis it is very important to form risk groups.*
Material and Methods: *104 pregnant women registered in the woman's polyclinics and delivered in the maternity hospitals of the Transcarpathian region of Ukraine between 2010 - Jan 1015. 54 pregnant women had gestational diabetes (group A), and 50 with risk factors of GDM development (group B). We analyzed the data.*
Results: *The biggest group of the women with GDM were aged 25-29 years 37.04%. Women with socioeconomic status less than average in the group A was significantly lower 25.93%, p=0.033. In 51.85% had 1 risk factor, in 35.19% hereditary factor, in 16.67% obesity, in others – combination of factors were present. The main risk factor was complicated obstetrical history - 68.52%, p=0.000. Hereditary was observed in 62.96% (p=0.011). Obesity was present in 64.81% women of the group A and in 12.00% (p=0.000) of group B.*
Conclusion: *The analysis of the obstetrical history, the presence of Diabetes mellitus type 2 in first-degree relatives, the degree of violation of lipid metabolism depending of the age gives the opportunity to form a higher risk group of the Gestational diabetes development.*

Keywords: *Pregnancy with GDM, Gestational diabetes mellitus, Risk factors of GDM, Gestational diabetes, Diabetes in Ukraine, Diabetes mellitus.*

1. INTRODUCTION

Gestational diabetes mellitus (GDM) is the most widespread form of endocrine system disorder, which leads to a number of complications and significantly influences the fetal development and postnatal adaptation of the newborn.

In women with this pathology after labour there is a risk of development of type 2 diabetes mellitus.[(1)]

1.1. Aims and Objectives

The one time detection and diagnosis of GDM is complicated by the fact that usually occurs with severe hyperglycemia and overt clinical manifestations. The main method is to conduct the glucose tolerance test in the term of 24-28 weeks of gestation, it means at the end of 2nd trimester.

At the same time the early diagnosis of this disease and adequate treatment allows significant reduction in the frequency of its complications.

That's why the aim of the work was to detect the main risk factors of GDM in the region in order to diagnose it in the early weeks and conduct the method of its prophylaxis.

2. LITERATURE REVIEW

The prevalence of GDM varies from 1.5 to 13% from the number of pregnant woman and depends on the methods of diagnosis, the scope screening and ethnicity.[4,6]

In Transcarpathian region according to the statistical data GDM complicates the course of pregnancy in less than 1% of the pregnant women, which indicates the imperfection of the group formation of women with a higher risk of this disease development and insufficient level of diagnostics.

3. MATERIAL & METHODS

A complex clinical-paraclinical investigation of 104 pregnant women was carried out, who were registered in the woman's polyclinics and whose delivery was conducted in the maternity hospitals of the Transcarpathian region of Ukraine in 2010- beginning of 2015. 54 pregnant women out of them were with GDM (group A) and 50 pregnant women were with risk factors of developing GDM, whose test was based on the glucose tolerance test and weren't diagnosed with gestational diabetes (group B). We analyzed the age differences, educational level, socioeconomic status, reproductive function of the pregnant women and the frequency of the risk factors of gestational diabetes.

- **Inclusion Criteria**

  Pregnant woman aged 18 - 40 years with risk factors to develop gestational diabetes mellitus.

- **Exclusion Criteria**

  a) Presence of Diabetes mellitus of type 1 and type 2,
  b) Tobacco smoking,
  c) Use of medical preparations that may influence glucose metabolism.

- **Diagnostic Approach**

According to the weight and height measurement when registered in the woman's polyclinics (gestational age 9-12 weeks) Index of the body mass index (by index Ketle). Based on the glucose tolerance test with 75 g of glucose[11] at 24-28 weeks of gestation a group with GD was formed. The level of glucose in the venous blood was investigated by the hexokinase method using the test systems Roche Diagnostics (Switzerland).

4. RESULTS, ANALYSIS AND DISCUSSION

4.1. Results and Analysis

- **Demographic distribution: The demographic distribution is shown in Table 1.**

Table 1: Demographic Distribution

	Group A	Group B	p
18 – 24 years, abs (%)	16 (29.63%)	19 (38.00%)	0.487
25 – 29 years, abs (%)	20 (37.04%)	13 (26.00%)	0.319
30 – 34 years, abs (%)	15 (27.78%)	16 (32.00%)	0.798
35 – 40 years, abs(%)	3 (5.56%)	2 (4.00%)	0.930

Agewise distribution: Aged 18-24 years in the 1 group was 16 (29.63%) women, in the second group – 19 (38%); 25-29 years – 20 (37.04%) and 13 (26%); 30-34 years 15 (27.78%) and 16 (32%), and 35-40 years accordingly 3(5.56%) and 2 (4%).

Table 2: Education and Socioeconomic Status of the Pregnant

	Group A	Group B	p
	Education		
Higher	21 (38.89%)	18 (36.00%)	0.919
Specialized secondary	20 (37.04%)	13 (26.00%)	0.319
Secondary education	13 (24.07%)	19 (38.00%)	0.185
	Socioeconomic Status		
Higher	5 (9.26%)	1 (2.00%)	0.244
Above average	16 (29.63%)	8 (16.00%)	0.157
Average	19 (35.19%)	17 (34.00%)	0.937
Below average	14 (25.93%)	24 (48.00%)	***0.033****

- **Educational level:** The number of women with higher educational status in both groups didn't differ – 21(38.89%) and 18(36%), with specialized secondary education was observed more in the group A - 20(37.04%) and with secondary education – in the group B was 19 (38%).

- **Socioeconomic status:** Higher socioeconomic status was in a non significant number of pregnant women of both the groups: in A group - 5 (9.26%) in B group 1 (2%), higher than average – in 16 (29.63%) and 8 (16%), average – in 19 (35.19%) and 17 (34%), below the average accordingly 14 (25.93%) and 24 (48%).

- **Reproductive Functions in the Investigated Women:** These are shown in Table 3.

Table 3: Reproductive Function in the Investigated Women

	Group A	Group B	p
Primigravida	16 (29.63%)	16 (32%)	0.933
Multipara	38 (70.37%)	34 (68%)	0.933
Oligomenorrhea	8 (14.81%)	9 (18%)	0.862
Medical Abortion in History	10 (18.52%)	12 (24%)	0.657
Ectopic Pregnancy in History	3 (7.89%)	1 (2.94%)	0.689
Missed Abortion	6 (15.79%)	1 (2.94%)	0.150
Infertility in History	7 (12.96%) 4 primary, 3 secondary	–	**0.025 ***

Parity: The number of primigravida and multipara in both groups was 16 (29.63%) and 16 (32.00%) and 38 (70.37%) and 34 (68.00%).
Oligomenorrhea: Oligomenorrhea among the investigated women was marked almost with the same frequency: in group A among 8 pregnant (14.81%), in group B – in 9 (18.00%)
Medical abortion in history: There was no difference in the frequency of medical abortions among the investigated patients, that composed in the 1 group 18.52% (10 investigated), and in the second – 24.00% (12 pregnant).
Ectopic pregnancy in history: Ectopic pregnancy was found in multipara of group A in 3 pregnant (7.89%), in the group B – in 1 woman (2.94%).
Missed abortion in history: The frequency of missed abortion in history in the group A composed 15.795 (6 cases), in the group B – 2.94% (1 case).
Infertility in history: Infertility in history was marked only in group A in 7 women (12.96%).

- **Analyses of the Main Risk factors of the Gestational Diabetes Development :** These are shown in Table 4.

Table 4: Frequency of the Main Risk Factors of Gestational Diabetes Development

	Group A	Group B	p
Diabetes in the First Line Relatives	34 (62.96%)	18 (36.00%)	**0.011***
Age more than 30 years	18 (33.33%)	18 (36.00%)	0.937
Gestational Diabetes in the Previous Pregnancy	3 (7.89%)	0 (0%)	0.279
BMI>25 kg/m^2	46 (85.19%)	33 (66.00%)	**0.040***
Big Fetus (> 4000 g) in History	15 (39.47%)	4 (11.76%)	**0.017***
Perinatal Loss in History	9 (23.68%)	1 (2.94%)	**0.028***
Spontaneous Abortion in History	13 (34.21%)	3 (8.82%)	**0.021***

Diabetes in the first line relatives: In the pregnant women of the first line hereditary factor was observed in 34 women (62.96%) in group A, in group B - in 18 (36.00%).
Age more than 30 years: In both groups there was number of women aged more than 30 years 18 in each, 33.33% and 36.00 accordingly.
Gestational diabetes in previous pregnancy: Gestational diabetes in previous pregnancy was marked only in 3 (7.89%) of the group A.
BMI >25 kg/m^2: 46 pregnant women (85.19%) of the 1 group had elevated BMI, in the second group- 33 (66.00%).

Big fetus (>4000g): Macrosomia in history was observed in the 1 group in 15 (39.47%), in the second – 2.94% (1 case).
Spontaneous abortion in history: In 13 (34.21%) woman of group A spontaneous abortions were observed and in 3 (8.82%) of group B.

- **Degree of Lipid Metabolism Violation :** The degree is shown in Table 5.

Table 5: Degree of the Lipid Metabolism Violation

	Group A	Group B	p
Normal weight	8 (14.81%)	17 (34.00%)	**0.040***
Overweight	11 (20.37%)	27 (54.00%)	**0.001***
Obesity of the 1 degree	19 (35.19%)	4 (8.00%)	**0.002***
Obesity of the 2 degree	10 (18.52%)	2 (4.00%)	**0.045***
Obesity of the 3 degree	6 (11.11%)	0 (0.00%)	**0.045***

Normal weight: Normal weight was observed in group B in 17 (34.00%) of the investigated patients, in group A – in 8 (14.81%).
Overweight: In group B there was observed more pregnant with overweight: 27 (54.00%) and 11 (20.37%) in group A.
1 degree obesity: Obesity of the 1 degree vice versa was diagnosed more in group A – in 19 (35.19%) cases, in group B – in 4 (8.00%%) of the cases.
2 degree obesity: In group A was observed in 10 (18.52%) and in group B – in 2 (4.00%) of the pregnant.
3 degree obesity: Obesity of the 3 degree was marked only in the pregnant of group A – in 11.11%.

4.2. Discussion

The traditional risk factors of gestational diabetes development include higher maternal age, increased body weight, higher parity, previous delivery of a macrosomic infant, and family history of DM.[2]

In our investigation the average age of the women of the A and B group didn't differ significantly and was 26.54 ± 4.38 and 26.34 ± 5.11, p=0.701. The biggest group of women with GDM was formed by the pregnant aged 25-29 years 20 (37.04%). There was found no significant difference between the age categories of the pregnant in the groups, probably because of the good demographic situation in the region.

The work of Rajput et al (2013)[8] showed, that the frequency of GDM in women with higher levels of education and socioeconomic status is higher. In our investigation, the educational level of the women of both groups statistically had no difference, in the same time the part of the women with socioeconomic status below average, the GDM was significantly lower – 14 (25.93%), p=0.033.

During analyses of the reproductive function of the investigated pregnant there was fond no significant difference in the parity, frequency of oligomenorrhea, medical abortions, ectopic pregnancies and missed abortions in history. At the same time the number of multipara with GD was in 2.4 times higher. Only in group A in 7 (12.96%) was marked infertility in history (in 7.40% primary and 5.56% secondary), p=0.025.

In 28 (51.85%) of the pregnant 1 risk factor was present (in 19(35.19%) – hereditary, in 9 (16.67%) – obesity), in others – combination of different factors. The main risk factor of Gestational diabetes was complicated obstetrical history (37 (68.52%), p=0.000). The frequency of spontaneous abortions in the investigated pregnant with GD was 34.21% (p=0.021), in 5 of them (13.16%) a combination of more than two. Big fetus in history was marked in 39.47% of the investigated (p=0.017), perinatal loss – in 23.68% (p=0.028).

Family history of DM is described as a risk factor for development of GDM.[5] The collected data show, that the hereditary factor was the second by significance and was observed in 34 (62.96%) of the pregnant of the 1 group, p=0.011. Diabetes of the 2 type in maternal and grandmother line relatives was marked in group A in 23 pregnant from 34, that is 2.09 times more frequent (p=0.008), that corresponds with the data collected by Harder et al (2001).[7]

5. CONCLUSION

Overweight is a well-known risk factor of GD development.[3] According to the survey conducted by Weiss et al the risk of GD

development in women with overweight increases by 2 times, in case of obesity – by 4 times.[9] Among the investigated women obesity was present in 35 (64.81%) of the pregnant of group A and in 6 (12.00%) of the B group, p=0.000, mainly of the 1 and 2 degree, the obesity of the 3 degree was only in the pregnant with GD.

The presence of GD in history was marked in only 3 (7.89%) of women, that in probably connected with low degree of detection during previous pregnancies.

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