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A Retrospective Analysis of the Course of Pregnancy, Childbirth, the Postpartum Period and the Condition of Newborns in Pregnant Women with ABO Immunization

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Results: Perinatal mortality in the group with ABO immunization who did not receive treatment was ten times more likely than in the group without immunization (3.3 and 33.3%, respectively).

Conclusion: The appointment of a powerful antihypoxant and metabolic drug Kokarnit prevented and treated fetal hypoxia, improved the status of the fetoplacental complex in pregnant women with ABO immunization, which was manifested by an increase in the Apgar score, the absence of severe hypoxic lesions of the fetus, an increase in the number of newborns with mild and moderate forms and absence severe hemolytic disease of newborns in mothers whose childbirth during the previous pregnancy ended in death or death from hemolytic disease of the newborn.

Keywords: ABO immunization, hemolytic disease of the newborn, somatic diseases, placental dysfunction, the blood group, the pregnancy.

I. Introduction

The problem of hemolytic disease of the fetus and newborns remains relevant in the world since there is no program for the mandatory prevention of ABO isoimmunization of women of reproductive age. Untimely diagnosis and inadequate therapy lead to disability of the child due to neurological disorders, somatic disorders, changes in immunological reactivity. Possible intrauterine fetal death [1, 2]

Over the past 50 years, there has been a decrease in perinatal mortality from hemolytic disease: from 50 to 25% with exchange transfusions, from 25 to 16% with early delivery, from 16 to 13% with the introduction of amniocentesis, to 3% or less after the beginning of the application of invasive methods of diagnosis and treatment (cordocentesis, intrauterine transfusion). However, it is not possible to completely prevent the morbidity and mortality of newborns from the hemolytic disease [3, 4].

Several of works are devoted to the study of the state of the immune system of the mother and fetus with incompatibility by the ABO antigen [3, 5].

According to A. G. Konoplyanikov et al. and C. A. Arbelaez-Garcia, the antigen-antibody complex that forms in the fetal blood upon receipt of maternal antibodies, can acquire antigenicity properties and cause the enhanced synthesis of immunoglobulins A and M by cells associated with its immunocompetence [1, 6].

ABO hemolytic disease of newborns develops quite often, although a severe form of this disease is rare. [2, 7]

Studies are being conducted on various problems of the immunopathology of pregnancy. However, many questions regarding the immunological aspects of pregnancy remain poorly understood.

Developing chronic hypoxic conditions of the fetoplacental complex due to immunological incompatibility lead to the persistent syndrome of secondary placental insufficiency [8].

With isserological incompatibility of the blood of the mother and the fetus, the maturation of the placenta is often disturbed [9].

Untimely diagnosis and inadequate therapy lead to disability of the child due to neurological disorders, somatic disorders, changes in immunological reactivity, fetal death is possible [10, 11,12].

Thus, the problem of ABO incompatibility remains relevant in the structure of maternal and perinatal pathology, which indicates the need to study this problem.

II. Materials and Methods

A retrospective clinical and statistical analysis of 10740 birth histories for the period 2008-2019 was carried out in the obstetric complex of the 2nd clinic of the Tashkent Medical Academy revealed that the proportion of the history of deliveries with O (I) Rh (+) blood type was in 3222 women, which was 30% if the

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proportion of ABO immunization was 0.01%, then the proportion of hemolytic disease of the newborn in the ABO immunization was 0.3%. Further, we analyzed 27 histories of deliveries with an ABO immunization that did not receive treatment during pregnancy regarding the existing immunization with the ABO system and 22 histories of the development of newborns born from them.

To obtain reliable information on the course of pregnancy, childbirth, the postpartum period, the condition of the fetus, and the newborn, we also analyzed 30 pregnant women with O (I) Rh group positive blood belongings without ABO immunization. The control group was recruited by random selection.

The age of pregnant women ranged from 19 to 37 years. The average age was 25.8 years.

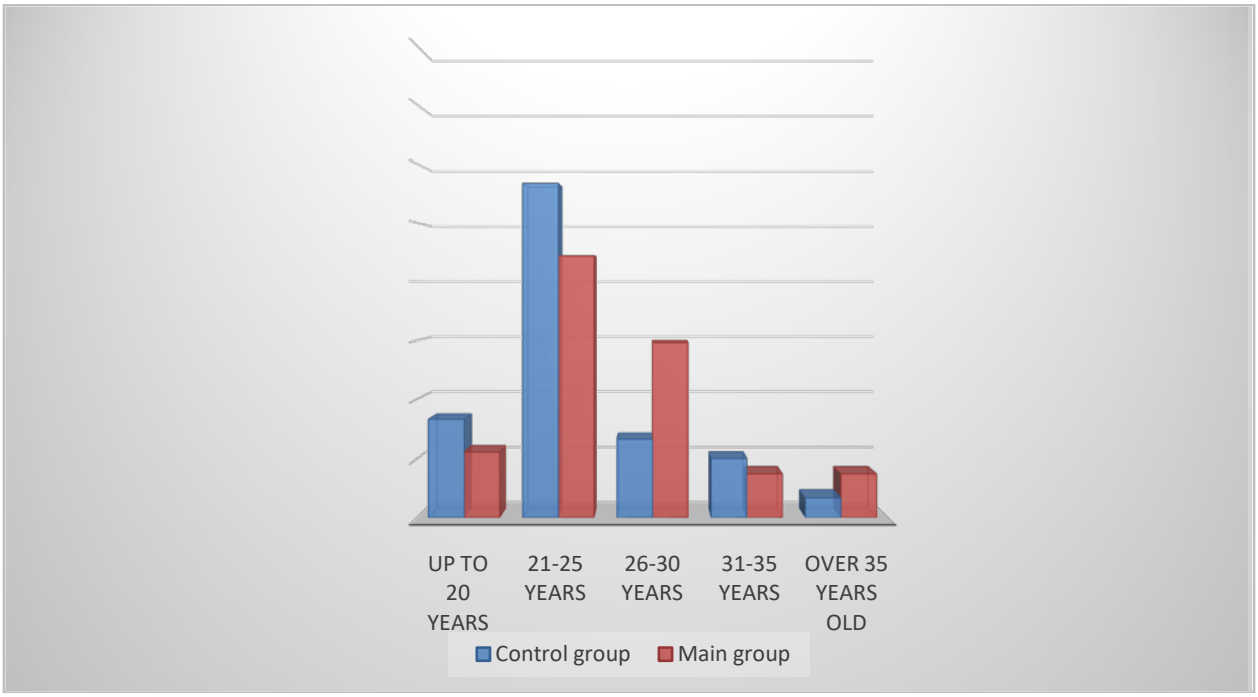


Figure 1: The age structure of pregnant women with ABO immunization

As can be seen from the presented figure 1., ABO immunization was more common at the age of 21-25 years, which corresponds to the most active period of reproductive function of women. By parity, women are distributed: first pregnant - 25.9%, first birth pregnant - 14.8%, reborn - 37.0%, multiparous - 22.3% (see Figure 2.).

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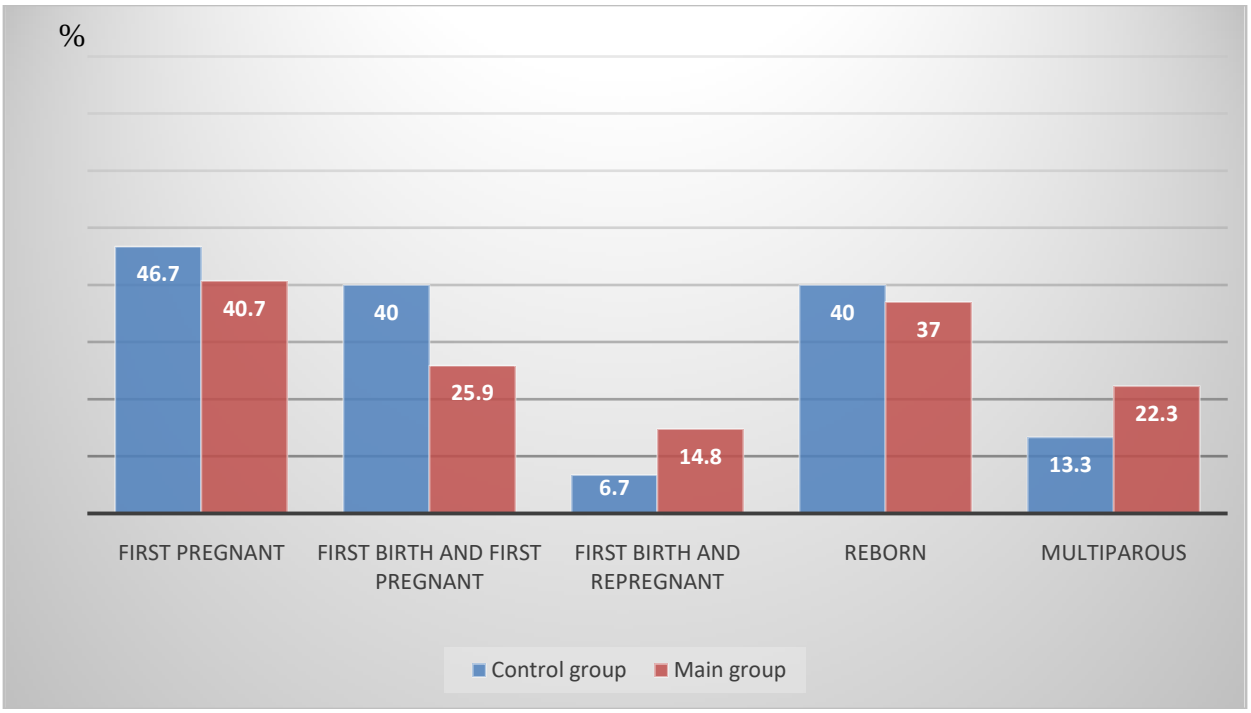


Figure 2: Parity of the analyzed pregnant

The analysis of parity showed that in both analyzed groups the number of first pregnant and pregnant women was almost the same, while the number of first births but prenatal during ABO immunization was 11.1% higher and 14.7% more indicating a possible transplacental casting antigens and increased risk of sensitization of the body according to the ABO system.

An analysis of somatic diseases in pregnant women with an ABO immunization who did not receive treatment during pregnancy revealed that in 83.3% of cases, they had a burdened somatic history.

Anemia was detected by 24.8% more often during pregnancy, and mainly of 1 degree. It should be noted that grade 2 anemia was observed two times more often than in the control group.

Table 1: Somatic diseases of the analyzed pregnant

Diseases	Control group, (n = 30)		Main group, (n = 27)		P
	abs.	%	abs.	%	
Anemia, of which:	17	56,7±9,2	22	81,5±7,6	<0,05
- 1 degree	16	53,3±9,3	20	74,1±8,6	>0,05
- 2 degrees	1	3,3±3,3	2	7,4±5,1	>0,05
Intrauterine infection	4	13,3±6,3	5	18,5±7,6	>0,05
Chronic cholecystitis	1	3,3±3,3	1	3,7±3,7	>0,05
Thyroid disease	5	16,7±6,9	5	18,5±7,6	>0,05
Obesity	2	6,7±4,6	1	3,7±3,7	>0,05
Rheumatism	1	3,3±3,3	2	7,4±5,1	>0,05
SARS during pregnancy.	3	10,0±5,6	4	14,8±7,0	>0,05
Exacerbation of somatic diseases during pregnancy.	0	0	3	11,1±6,2	>0,05
Cardiovascular diseases	0	0	2	7,4±5,1	>0,05
Epidemic hepatitis	9	30,0±8,5	2	7,4±5,1	<0,05
Varicose veins	2	6,7±4,6	3	11,1±6,2	>0,05
Chronic tonsillitis	2	6,7±4,6	3	11,1±6,2	>0,05
Chr. bronchitis	1	3,3±3,3	0	0	>0,05

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Urinary tract infections and thyroid diseases, as a regional pathology, were observed almost equally often in both groups.

The same trend was observed for rheumatism, chronic tonsillitis and, acute respiratory viral infections during pregnancy, as an infectious-inflammatory process and also as one of the possible factors of immunization.

Gynecological history was burdened by: spontaneous miscarriage - in 25.9% (once - in 18.0%, twice or more - in 7.9%), artificial abortion - in 22.2% (once - in 13.5%, twice and more - in 8.7%), infertility - in 3.7%, non-developing pregnancy - in pregnant women in the anamnesis - in 14.8% (see Table 2). This analysis showed that the burdened gynecological history in the ABO immunization was weighed down by spontaneous miscarriage 3.9 times more often, non-developing pregnancy 4.5 times more often than in the group with O blood group Rh-positive factor without immunization, which may indirectly indicate as a possible factor of immunization, and on the typical complications of pregnancy during an ABO immunization [13].

Table 2: Gynecological history of the analyzed pregnant

Anamnestic indicator	Control group, (n = 30)		Main-group, (n = 27)		P
	abs.	%	abs.	%	
Spontaneous miscarriage	2	6,7±4,6	7	25,9±8,6	<0,05
Artifical abortion	10	33,3±8,8	6	22,2±8,2	>0,05
Non-viable intrauterine pregnancy	1	3,3±3,3	4	14,8±7,0	>0,05
Infertility	0	0	1	3,7±3,7	>0,05

When analyzing the obstetric history, it was found that in repeated births, previous pregnancies and childbirths were complicated by premature birth at 35-36 weeks of pregnancy in 3 (11.1%) women, whereas in the control group this complication of the course of pregnancy did not occur (see Table. 3). Late deliveries due to late delivery were in 1 (3.7%) women of the Main-group, urgent deliveries in 29 (96.7%) and 24 (85.2%), respectively. 55.6% of pregnant women with ABO immunization had polyhydramnios, which coincides with the literature [14]. Pregnant women of the Main group in 44.4% of cases had premature amniotic fluid discharge due to the available intrauterine infection, which is two times more often than in the control group.

Table 3: Obstetric history of pregnant women analyzed

Anamnestic indicator	Control group, (n = 30)		Main group, (n = 27)		P
	abs.	%	abs.	%	
Vaginal birth	29	96,7±3,3	24	88,9±6,2	>0,05
Operative delivery	1	3,3±3,3	3	11,1±6,2	>0,05
Delivery on time	29	96,7±3,3	23	85,2±7,0	>0,05
Premature birth	0	0	3	11,1±6,2	>0,05
Belated birth	1	3,3±3,3	1	3,7±3,7	>0,05
The threat of abortion, of which:	13	43,3±9,2	24	88,9±6,2	<0,001
The threat of early interruption	3	10,0±5,6	13	48,1±9,8	<0,01
The threat of late interruption	10	33,3±8,8	11	40,7±9,6	<0,05
Placental dysfunction	7	23,3±7,9	23	85,2±7,0	<0,001
Intrauterine infection	2	6,7±4,6	15	55,6±9,7	<0,001
Polyhydramnios	2	6,7±4,6	15	55,6±9,7	<0,001
Prenatal rupture of membranes	6	20,0±7,4	12	44,4±9,7	<0,05
Weak labor	0	0	2	7,4±5,1	>0,05
Premature detachment of a normally located placenta	0	0	5	18,5±7,6	<0,05
Hypotonic bleeding	0	0	2	7,4±5,1	>0,05
Defect of the placenta (Manual examination of the uterine cavity)	3	10,0±5,6	2	7,4±5,1	>0,05

Complications such as weak labor (7.4%), premature detachment of a normally located placenta (18.5%) and hypotonic bleeding in the subsequent and early postpartum periods (7.4%) occurred exclusively in women in labor with ABO immunization.

The analysis of the course of pregnancy and childbirth revealed a high frequency of complications in the presence of an ABO immunization, which in itself requires antenatal diagnosis, treatment before pregnancy and the implementation of evidence-based therapy during the entire gestational gestation period.

Since in 5 cases the pregnancy in this group was terminated earlier than 28 weeks, the analysis of perinatal complications in this group of a third was

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carried out only in 22 newborns and revealed significant excesses of these up to perinatal losses.

Such a condition as the early gestational age of the fetuswas observed in 11.1% of children with HDN (see Table 4.). More than two newborns were born in a state of asphyxia and every second newborn in moderate asphyxia in the presence of an ABO immunization.

Table 4: Perinatal complications of the analyzed pregnant

Anamnestic indicator	Control group, (n = 30)		Main group, (n = 27)		P
	abs.	%	abs.	%	
Small gestational age of the fetus	1	3,3±3,3	3	11,1±6,2	>0,05
Asphyxia, including:	2	6,7±4,6	24	88,9±6,2	<0,001
Moderate	2	6,7±4,6	8	29,6±9,0	<0,05
Heavy	0	0	16	59,3±9,6	<0,001
Perinatal mortality, of which:	1	3,3±3,3	12	44,4±9,7	<0,001
Antenatal	1	3,3±3,3	5	18,5±7,6	<0,05
Intranatal	0	0	2	7,4±5,1	>0,05
Postnatal	0	0	5	18,5±7,6	<0,05

Perinatal losses in ABO immunization occurred 13 times more often - 3.3 and 44.4%, respectively, of the groups. The death of newborns in the ABO immunization was ante- and postnatally detected equally often (18.5%), and intranasallyin 7.4% of cases, which significantly exceeds the population indicators.

From the obstetric and gynecological history, the high frequency of perinatal mortality, premature birth, spontaneous abortion, bleeding during childbirth, and the early postpartum period is noteworthy, which can be associated with the formed ABO immunization by this period.

As can be seen from Table 5, vomiting of pregnant women with ABO immunization complicated the course of pregnancy 1.8 times more often than in the control group.

Table 5: Complications of the course of this pregnancy with ABO immunization in womennot treated during pregnancy

Complications	Control group, (n = 30)		Main group, (n = 27)		P
	abs.	%	abs.	%	
Vomiting pregnant	11	36,7±9,0	18	66,7±9,2	<0,05
Spontaneous miscarriage	0	0,0	5	18,5±7,6	<0,05
The threat of abortion, of which:	13	43,3±9,2	19	70,4±9,0	<0,05
The threat of early interruption	3	10,0±5,6	10	37,0±9,5	<0,05
The threat of late interruption	10	33,3±8,8	9	33,3±9,2	>0,05
Anemia	17	56,7±9,2	9	33,3±9,2	<0,05
Hypertensive disorders	3	10,0±5,6	7	25,9±8,6	>0,05
Prenatal rupture of membranes	6	20,0±7,4	12	44,4±9,7	<0,05
Placental dysfunction	7	23,3±7,9	21	77,8±8,2	<0,001
Intrauterine infection	10	33,3±8,8	17	63,0±9,5	<0,05

Spontaneous miscarriages were only in the Main group - 18.5%. The threat of abortion in the main group occurred 1.6 times more often than in the control group (43.3 and 70.4%, respectively, groups), and with almost the same frequency in both I (37.0%) and II (33.3%) half of pregnancy. Hypertensive disorders during pregnancy in the group with ABO immunization were detected 2.6 times more often and mainly as gestational hypertension.

All these complications of the course of this pregnancy were clinically and instrumentally diagnosed with placental dysfunction in 77.8%, and in 63.0%, placental dysfunction was against the background of intrauterine infection, most often combined etiology. These indicators exceeded those of the control group by 1.9 (intrauterine infection) and 3.3 times (placental dysfunction).

Isosensitization for group factors is not indifferent for a pregnant woman and, as a rule, plays a triggering role in the development of several complications.

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At the same time, these complications, increasing the permeability of the placental barrier, exacerbate the severity of the manifestation of immunization.

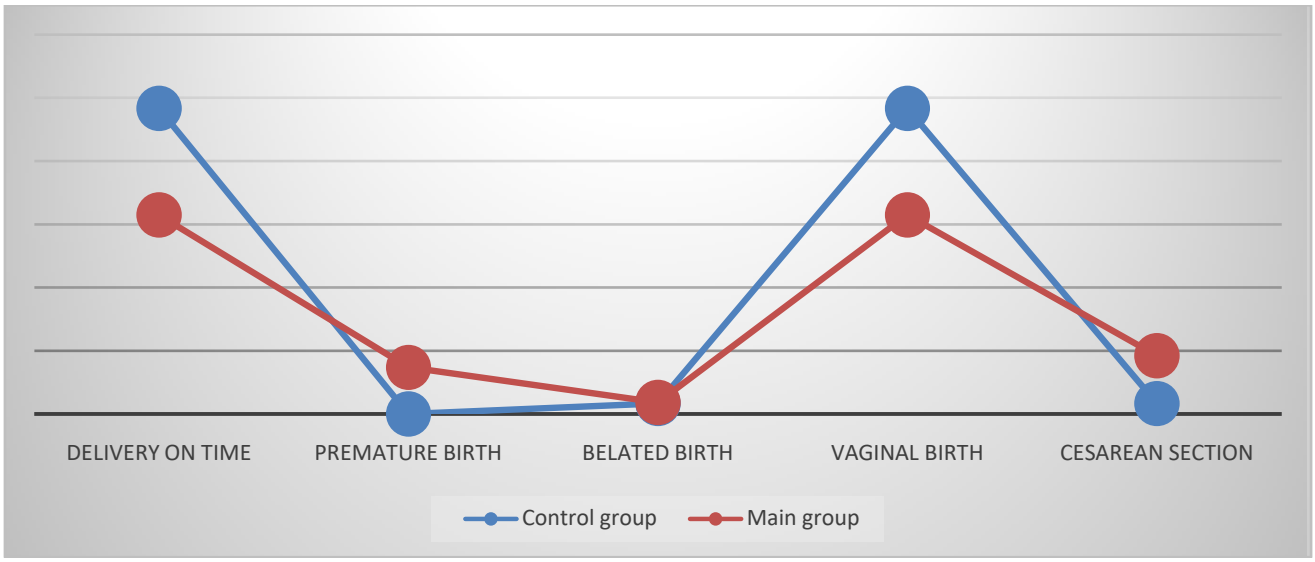


Figure 3: The outcome of labor in pregnant women with an ABO immunization who did not receive treatment during pregnancy

When analyzing the course of childbirth, it was revealed that 63.0% of women of the 1st group and 96.7% of the control gave birth on time (see Figure 3). Conservative delivery (17) 63.0%, operative delivery (5) 18.5% of women, of which, due to insolvency of the uterine scar, 2 (40.0%), premature detachment of a normally located placenta, 3 (60.0%). In the control group, 3.3% of women in labor due to hip disproportion were operatively delivered.

As can be seen from Table 6., in pregnant women with ABO immunization, a high incidence of premature rupture of the fetal bladder is noted - 44.4%, which is 2.2 times more often compared with the control group. Premature detachment of a normally located placenta, as the most severe obstetric complication, was observed in almost half of women in childbirth during an ABO immunization (48.1%), possibly associated with a high incidence of placental dysfunction (77.8%).

Weak labor activity was only in the group with ABO immunization (14.8%). Manual examination of the uterine cavity for a placental defect, possibly associated with a high percentage of intrauterine infection, was more than two times more likely than the control group. Hypotonic bleeding in the subsequent and early postpartum periods was in 18.5% of cases exclusively in the group with ABO immunization.

Table 6: Complications of childbirth and the early postpartum period in pregnant women with ABO immunization who did not receive treatment during pregnancy

Complications	Control group, (n = 30)		Main group, (n = 27)		P
	abs.	%	abs.	%	
Premature detachment of a normally located placenta	0	0	13	48,1±9,8	<0,001
Prenatal rupture of membranes	6	20,0±7,4	12	44,4±9,7	<0,05
Weak labor	0	0	4	14,8±7,0	<0,05
Defect of the afterbirth	1	3,3±3,3	5	18,5±7,6	>0,05
Manual examination of the uterine cavity	1	3,3±3,3	2	7,4±5,1	>0,05
Hypotonic bleeding	0	0	5	18,5±7,6	<0,05
Uterine subinvolution	3	10,0±5,6	5	18,5±7,6	>0,05

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Complications of the postpartum period, such as uterine subinvolution, were noted 8.5% more often than the control group.

At birth, the content of total bilirubin in 58.1% of newborns did not exceed 85 μmol/l, in 34.6% it ranged from 86 to 134 μmol/l; in 7.3%, it was 135 μmol/l and higher.

Perinatal mortality (see Figure 4) in the group with ABO immunization who did not receive treatment was ten times more likely than in the group without immunization (3.3 and 33.3%, respectively).

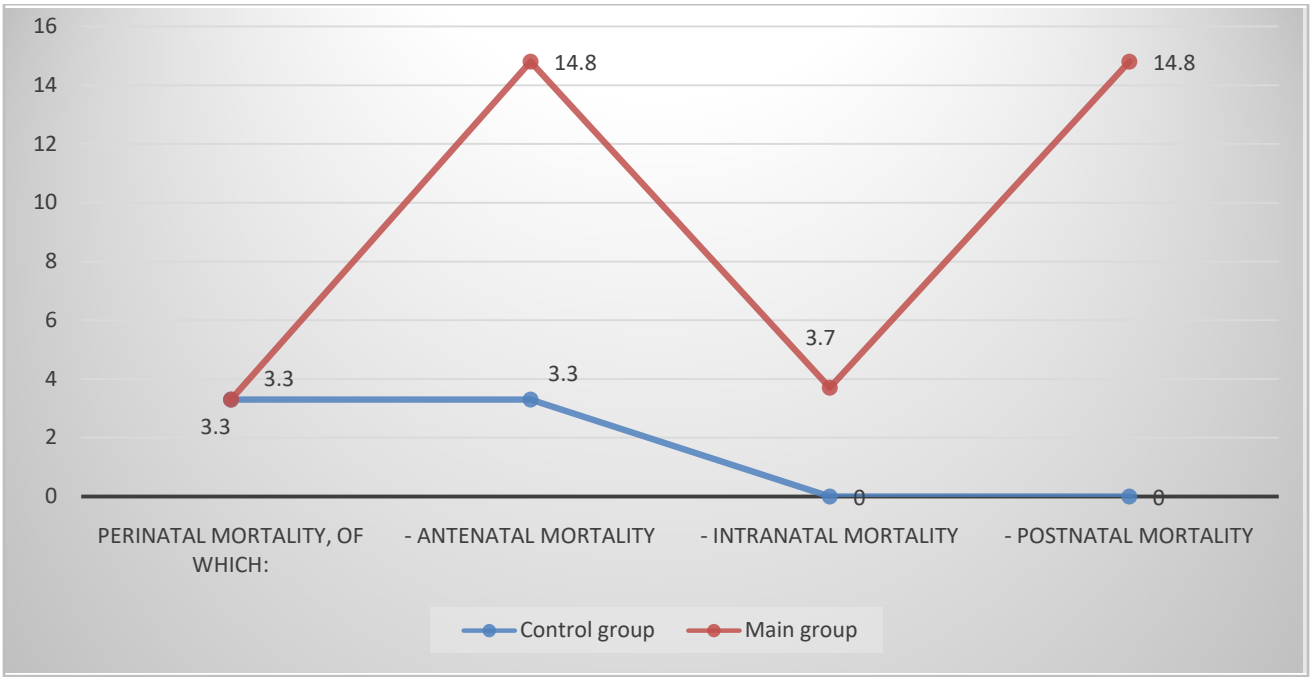


Figure 4: Perinatal losses in pregnant women with an ABO immunization not receiving treatment during pregnancy

III. Results and Discussion

So the age period of the frequent occurrence of ABO immunization is 21-25 years. The parity of pregnant women was more often primordial with ABO immunization, which coincides with the data in Figure 2.

Parity analysis showed that the number of primiparas and pre-pregnant during ABO immunization was 1.8 times greater, and 14.7% more were re-births, which coincides with the literature data on the frequent detection of sensitization by ABO system in pre-pregnant women [14]. Anemia during pregnancy, urinary tract infection, and thyroid disease was identified as a regional pathology by 24.8% and were observed almost equally often in both groups. Exacerbation of somatic pathology during pregnancy with ABO immunization, as a possible contributing factor to immunization, was observed in 11.1% of pregnant women.

The gynecological history of ABO immunization was 3.9 times more likely to be aggravated by spontaneous miscarriage, non-developing pregnancy 4.5 times more often than in the group without immunization, which can be considered as a possible factor of immunization, as well as complications of pregnancy during ABO immunization [15].

Analysis of analysis of obstetric history in 55.6% of pregnant women with ABO immunization showed the presence of polyhydramnios, which coincides with the literature [16]. In a state of malnutrition, children were born in 11.1% of patients with ABO immunization. More than two-thirds of newborns were born in a state of asphyxiation and every second newborn in severe asphyxiation.

In the untreated group, vomiting of pregnant women with ABO immunization complicated pregnancy during 30.0% more often, the threat of termination of pregnancy in the main group occurred 1.6 times, and hypertensive disorders during pregnancy mainly as hypertensive disorders in 2, 6 times more often, high rates were for intrauterine infections (63%) and placental insufficiency (77.8%), which undoubtedly increases the percentage of obstetric and perinatal complications [15, 16].

Thus, premature detachment of a normally located placenta, as the most severe obstetric complication, was observed in almost half of women in labor (48.1%) during ABO immunization.

Premature rupture of the fetal bladder was observed 2.2 times more often compared with the control group. Weak labor was only in the group with

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ABO immunization (14.8%). Manual examination of the uterine cavity regarding a placental defect, possibly associated with a high percentage of intrauterine infection, was more than two times more likely than the control group. Hypotonic bleeding in the subsequent and early postpartum periods was in 18.5% of cases exclusively in the group with ABO immunization, and uterine subinvolution was noted in 8.5% more often than the control group. Perinatal mortality in the group with ABO immunization who did not receive treatment was ten times more likely than in the group without immunization, and equally often anti- and postnatal (14.8% each).

IV. Conclusions

Thus, summarizing the generally conducted retrospective analysis of the course of pregnancy, childbirth, the postpartum period and the condition of newborns in pregnant women with ABO immunization who did not receive treatment during pregnancy, it was shown that the number of primiparous and primary pregnant with ABO immunization was 2.8 times more than primiparas but re-pregnant. Exacerbation of somatic pathology during pregnancy with an ABO immunization, as a possible contributing factor to immunization, was observed in 3.3% of pregnant women.

The most terrible outcome of childbirth is a high percentage of perinatal losses, which leads to severe medical and social problems in such women. Therefore, timely diagnosis of ABO immunization, antenatal preparation with the search for new therapeutic measures will help to reduce both obstetric and perinatal complications.

The course of pregnancy often takes place against the background of anemia, chronic pyelonephritis, thyroid diseases, acute respiratory viral infections, and exacerbation of chronic foci of somatic diseases. Also, pregnancy is complicated by persistent symptoms of the threat of termination of pregnancy on the background of placental dysfunction and intrauterine infection.

All pregnant women with ABO immunization have a burdened gynecological and obstetric history and a perinatal history.

All of the above, of course, affects the condition of the fetus and the outcome of childbirth, and as a result of this, childbirth often occurs in childbirth, prenatal rupture of membranes, premature detachment of a normally located placenta, and weakness of labor. In connection with which, more often, delivery is resolved promptly, and more often, operational benefits in childbirth (manual examination of the uterine cavity) are used. The most terrible outcome of childbirth is a high percentage of perinatal losses, which leads to severe medical and social problems in such women. Therefore, timely diagnosis and treatment of ABO immunization, their antenatal preparation with the search for new therapeutic measures will help reduce both obstetric and perinatal complications.

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