

FEATURES OF THE COURSE OF PREGNANCY, CHILDBIRTH AND OUTCOMES FOR THE MOTHER AND FOETUS WITH PYELONEPHRITIS

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On the basis of the Kyrgyz Research Center for Human Reproduction was conducted a cohort prospective research between 2015-2017. The object of the research was 455 pregnant women: 1st group – 158 women with gestational pyelonephritis, 2nd group – 147 women with chronic pyelonephritis, 3rd control group – 150 healthy. There were calculated the relative values (P) and their errors (mp), t – Student's criteria, χ^2 and Spearman's rank correlation coefficient. As a result of the research, it was proved that the complicated course of pregnancy was more often detected in the group with gestational pyelonephritis (31.0%) than in the group with chronic pyelonephritis (23.1%). In the first group, there were 2.5 complications per pregnant woman, in the second group – 1.9 detected complications, $p < 0.001$. Pregnancy with gestational pyelonephritis was complicated: gestational anemia (31.0%), hydramnios (12.0%), oligohydramnios (9.5%), fetoplacental insufficiency (8.2%), threat of miscarriage (7.0%), intrauterine infection (3.8%), hydronephrotic transformation of the kidneys (3.2%), preeclampsia heavy (3.2%) and light (1.3%) degree. In the group with chronic pyelonephritis, pregnancy was complicated: gestational anemia (14.3%), threat of miscarriage (5.4%), hard preeclampsia (4.8%), hydronephrotic transformation of the kidneys (4.1%), intrauterine growth retardation (IUGR) (3.4%), partial premature detachment of the placenta (3.4%), fetoplacental insufficiency (2.7%), intrauterine infection (2.7%), oligohydramnios (2.0%), antenatal fetal death (0.7%), hydramnios (0.7%). When comparing in the first group, there were significantly more frequent: hydramnios ($t = 4.20$, $p < 0.001$), oligohydramnios ($t = 2.89$, $p = 0.004$) and fetoplacental insufficiency ($t = 2.15$, $p = 0.03$). Immediate childbirth was 96.2% of women in the first group and 94.6% in the second. Complications with childbirth were significantly more often detected of pregnant women with chronic pyelonephritis – 30.6% than in the first group – 14.6%, $p < 0.001$ and control group – 8.7%, $p < 0.001$. Women with complicated childbirths in the first group – 12.0%, in the second group – 21.8%, $p = 0.02$, in the control group – 8.0%, significantly less than in the second group, $p < 0.001$. In women with chronic pyelonephritis in the structure of complications: prenatal outflow of amniotic fluid (15.0%), injuries of soft tissues (5.4%), premature abruption of the normally located placenta (3.4%), pelvic presentation (2.7%), hypotonic bleeding (1.4%), weakness of birth activity (0.7%), puerperal endometritis (2.0%). In the first group (94.3%) and the second group (87.8%) significantly fewer healthy newborns in comparison with the control group ($p = 0.001$ and $p < 0.001$, respectively). When evaluating a newborn by Apgar children in the control group (100.0%) were born with a higher score (8-9 points) than in the first group, 88.6% of the children, $p < 0.001$ and in the second group 84.4%, $p < 0.001$. Children of the first group (3.8%) and the second group (2.7%) estimated less than 6 points. In the second group the congenital malformations of the fetus and stillbirths 0.7%. Immature infants in the first group 3.8%, in the second 5.4%.

Keywords: pyelonephritis, pregnancy, childbirth, complications, outcomes, prospective research

The relevance of gestational pyelonephritis is due to an increase in the growth of infectious and inflammatory diseases of the urinary tract in women in recent years. There are cases of purulent-destructive forms of acute pyelonephritis of pregnant women, as well as complications in the form of gestosis, fetal hypotrophy, premature birth and chronic placental insufficiency. [1].

O.V. Lysenko with the co-author (2016) note that pregnant women with chronic pyelonephritis have a higher incidence of complications of gestation, and with exacerbation of chronic pyelonephritis, there significantly more children who are born with intrauterine infections, and so it is necessary to conduct a detailed examination of the pregnant woman in the course of clinical observation and timely sanitation of urogenital infections [2].

It is proved that the most informative signs of the probability of intrauterine infection are hydramnios or oligohydramnios, persistent fetal tachycardia, a decrease in its mass-growth parameters, violation of the structure of the

placenta, pathological changes in the organs of the fetus [3].

In the work of S.P. Seregin with the co-author (2018) revealed that changes in immunity indicators are more pronounced in patients with gestational pyelonephritis, in comparison with women suffering from chronic pyelonephritis, who had an exacerbation during pregnancy [4].

It was proved that the most pronounced changes in uteroplacental blood flow were found in patients with an active inflammatory process in the kidneys during pregnancy. But even in the absence of exacerbation of pyelonephritis there are significant changes in uteroplacental blood flow. The obtained results testify to the need to develop measures for pre-gravid preparation in patients with chronic pyelonephritis and to prevent exacerbations of the inflammatory process during pregnancy [5].

The purpose of the research was to determine the features of the clinical course of pregnancy, childbirth and outcomes for the mother and fetus with pyelonephritis.

Material and methods of research

A cohort prospective study was conducted between 2015-2017 on the basis of the Kyrgyz Research Center for Human Reproduction of the Ministry of Health of the Kyrgyz Republic (KRCHR MH KR).

The required sample size was calculated according to E.N. Shiganu (1987) ($t = 3.2$, $P < 0.001$, 99.9%) [6]. The subject of the research was 455 pregnant women, which were divided into 3 groups: the 1st group – 158 pregnant women with gestational pyelonephritis, the 2nd group – 147 women with chronic pyelonephritis, the 3rd control group – 150 healthy women. The unit of study was a pregnant woman.

Inclusion criteria: pregnant women aged 18 to 49 years. The average age of the pregnant women of the first group was 29.7 ± 0.2 years for 100 of the examined, of the second group – 28.1 ± 0.2 per 100 of the examined and control group – 29.5 ± 0.2 years for 100 of the examined, which confirms the representativeness of the compared groups, $p > 0.05$.

From the histories of childbirth form 096/u from Sep. 10th, 2002 No. 375 and individual cards of the pregnant woman and the puerpera form 111/u from March 25th, 2013 No. 134 on the observation cards the following results were introduced: comprehensive survey of pregnant women, data on the structure of complications of pregnancy, features of gestational process, the course of birth and the outcome of birth for the mother, fetus and newborn.

There are calculated relative values (P) and their errors (mp). To evaluate the reliability of the difference in the numerical values of relative indicators, there was calculated the reliability criterion (the confidence coefficient t -criterion of the Student and χ^2) recommended by N.E. Chernova (2006) for medico-social

researches using the formula $t = \frac{P2 - P1}{m \text{ differ}}$, at

$t = 3.2$ the probability of difference is 99.9% or the reliability of the differences is < 0.001 [6]. As probability values of the error-free forecast, the criteria of the static significance of the error were chosen – less than 5% two-sided ($p < 0.05$), with 95% confidence interval, and statistical power – 80% power. The rank significance was calculated by the Spearman rank correlation coefficient using the formula:

$p = 1 - \frac{\Sigma 6d^2 + A + B}{n^3 - n}$. For the statistical processing of the received data was used the on-line free software package OpenEpi 3.03 of the Center for US morbidity control.

Results of the research and their discussion

The information presented in Table 1 on the peculiarities of the course of the gestational process in women with pyelonephritis indicates that women with a complicated pregnancy were detected more in the group of pregnant women with gestational pyelonephritis (1st group) – 49 pregnant (31.0%), i.e. every third woman than in the second group (with chronic pyelonephritis) – 34 pregnant women (23.1%), every fourth woman, with the difference statistically not significant, $t = 1.55$, $p = 0.12$. In the control group, women with complicated pregnancies were also identified – 15 women (10.0%), i.e. every tenth woman, which is statistically significantly less likely than in the first group $t = 4.70$, $p < 0.001$ and in the second comparison group $t = 3.05$, $p = 0.001$.

It should be noted that complications were detected more often in the first group, 125 complications were revealed, i.e. for 1 pregnant woman there are 2.5 complications, and in the second group 65 complications, for 1.9 detected complications, $t = 6.71$, $p < 0.001$, while in the control group there are significantly less complications of pregnancy (15 complications), in comparison with the first group $t = 17.02$, $p < 0.001$ and with the second group – $t = 7.12$, $p < 0.001$.

Pregnancy in women with gestational pyelonephritis was complicated (group 1): gestational anemia, which accounts for the first ranked place, was found in 31.0% of women, the second – is hydramnios 12.0%, in third place is oligohydramnios (9.5%), the fourth ranked place – fetoplacental insufficiency (FPI – 8.2%). Further on, the decreasing threat of miscarriage (7.0%), intrauterine infection – 3.8%, the seventh ranked place belongs to the hydronephrosistransformation of the kidneys (3.2%) and hard preeclampsia (3.2%), and the next one is light preeclampsia (1.3%).

In a group of women with chronic pyelonephritis (2nd group), the first ranked place also falls on gestational anemia (14.3%), the second place is the threat of miscarriage (5.4%), the third – hard preeclampsia (4.8%), the fourth – hydronephrosis transformation of the kidneys (4.1%), the fifth ranking place is occupied by intrauterine growth retardation (3.4%) and partial premature placental abruption (3.4%). The seventh ranked place falls on fetoplacental insufficiency (2.7%) and intrauterine infection (2.7%), followings are oligohydramnios (2.0%), antenatal fetal death (0.7%) and hydramnios (0.7%).

In the control group, the pregnancy was complicated by gestational anemia in 15 women (10.0%), and no other pathology was observed during pregnancy.

When comparing the main groups among themselves in the first group, there were significantly more frequent occurrences: hydramnios ($t = 4.20, p < 0.001$), oligohydramnios ($t = 2.89, p = 0.004$) and fetoplacental insufficiency ($t = 2.15, p = 0.03$). In the first group, there were no cases of partial placental abruption, intrauterine growth retardation, and antenatal fetal death.

The features of the course of childbirth of pregnant women with pyelonephritis are presented in Table 2. Urgent births were found in 152 pregnant women of the first group (96.2%) and 139 women of the second group (94.6%), there was no significant difference in the groups, $p > 0.05$. At the same time, in the control group, pregnancy of all women ended with immediate childbirth (100%), which was statistically significant with the first group ($t = 2.53, p = 0.01$) and the second comparison group ($t = 2.84, p = 0.004$). Independent childbirths were in 86.7% of women in the first group, 81.0% in the second group and 86.7% in the control group, $p > 0.05$. Childbirths by cesarean section were 1.9% in the first group, 6.1% in the second group, differences between the groups were not significant, $t = 1.84, p = 0.06$, in the control group, abdominal childbirths were 1.3% of women, the differ-

ence in comparison with the second group is statistically significant, $t = 2.19, p = 0.02$. Re-operative birth, the indication for which was a scar on the uterus, was 7.6% of the first group's women, 7.5% of the pregnant women in the second group and 12.0% of the women in the control group, no statistically significant differences between the groups were found, $p > 0.05$.

In the first group, the pregnancy ended in very early birth of 2 pregnant women, which was 1.3%. Early births in the first group occurred in 2.5% of women, in the second group 2.0% of women, there was no significant difference, $p > 0.05$. Premature childbirths were in 5 women (3.4%) of the second comparison group.

The number of women with complicated childbirths in the first group was 19 (12.0%), in the second group – 32 (21.8%), which is significantly more often than the first group $t = 2.29, p = 0.02$, in the control group childbirths were complicated in 12 women (8.0%), which is significantly less likely than in the second group, $t = 3.41, p < 0.001$. In pregnant women with chronic pyelonephritis (2nd group), the complications of birth were significantly more frequent than in the first group – 14.6%, $t = 3.39, p < 0.001$ and control group 8.7%, $t = 4.43, p < 0.001$.

Table 1

Features of the course of the gestational process (per 100 surveyed)

Indicators	Main groups				Control group	
	I group		II group		n = 150	
	n = 158		n = 147			
	abs.	M ± m	abs.	M ± m	abs.	M ± m
Number of women with complicated pregnancies	49	31.0 ± 3.7***	34	23.1 ± 3.5***	15	10.0 ± 2.5
Types of complications:	125	79.1 ± 3.2***	65	44.2 ± 4.1***	15	10.0 ± 2.5
Hydronephrosis transformation of the kidneys	5	3.2 ± 1.4	6	4.1 ± 1.6	–	–
Gestational anemia	49	31.0 ± 3.7	21	14.3 ± 2.9	15	10.0 ± 2.5
Light degree of preeclampsia	2	1.3 ± 0.9	–	–	–	–
Hard degree of preeclampsia	5	3.2 ± 1.4	7	4.8 ± 1.8	–	–
Oligohydramnios	15	9.5 ± 2.3	3	2.0 ± 1.2**	–	–
Hydramnios	19	12.0 ± 2.6	1	0.7 ± 0.7***	–	–
Fetoplacental insufficiency	13	8.2 ± 2.2	4	2.7 ± 1.3*	–	–
Intrauterine growth retardation	–	–	5	3.4 ± 1.5	–	–
Threat of miscarriage	11	7.0 ± 2.0	8	5.4 ± 1.9	–	–
Partial premature placental abruption	–	–	5	3.4 ± 1.5	–	–
Intrauterine infection	6	3.8 ± 1.5	4	2.7 ± 1.3	–	–
Antenatal fetal death	–	–	1	0.7 ± 0.7	–	–

Note: the reliability of the differences between the groups * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the first group (women with gestational pyelonephritis), births were complicated by soft tissue injuries in 7.6% of women, prenatal outflow of amniotic fluid – 5.7% and pelvic presentation – (1.3%).

In women with chronic pyelonephritis (2nd group), in the structure of complications, the first ranked place falls on the prenatal outflow of amniotic fluid in 22 women – (15.0%), the second – soft tissue injuries 5.4%, in third place is a premature detachment of normally located placenta – (3.4%), the fourth – pelvic presentation – (2.7%), followed by hypotonic bleeding – (1.4%) and weakness of birth activity – (0.7%).

In the control group, the structure of the complications in birth is as follows: the first rank place falls on the prenatal outflow of amniotic fluid, which complicated birth of 6 women (4.0%), soft tissue injuries in 3.3% of women and pelvic presentation – (1.3%).

Comparing the groups among themselves, in the second group we found a statistically significant difference in the anterior distribution of amniotic fluid with the first group $t = 2.72$, $p = 0.006$ and control group, $t = 3.32$, $p = 0.001$.

In addition, in the second group, birth was complicated by postpartum endometritis of 3 women (2.0%).

The outcome of birth for the fetus and the newborn is presented in Table 3. In the first (94.3%) and in the second (87.8%) groups, significantly less healthy newborns compared with the control group ($t = 3.177$, $p = 0.001$ and $t = 4.52$, $p < 0.001$, respectively). When assessing the state of a newborn on the Apgar scale, it is seen that children in the control group were significantly more likely to be born with a higher score (8-9 points) than in other groups. In the first group, 88.6% of children compared with the control group (100.0%) $t = 4.56$, $p < 0.001$ and in the second group 84.4%, $t = 5.20$, $p < 0.001$. In the first group, 3.2% of newborns at child-births were evaluated at 7-6 points, in the second group at 3.4% of the total number of newborns, there was no significant difference between the groups, $p > 0.05$. Less than 6 points were in 3.8% of children in the first group and 2.7% in the second, $p > 0.05$. In addition, in the second group there was 1 stillborn child (0.7%) and 1 newborn with congenital heart disease (0.7%). The dead children in the compared groups were not identified.

Features of the course of birth (per 100 surveyed)

Table 2

Indicators	Main groups				Control group	
	I group		II group		n = 150	
	n = 158		n = 147			
	Abs.	M ± m	Abs.	M ± m	Abs.	M ± m
Immediate childbirths:	152	96.2 ± 1.5**	139	94.6 ± 1.9**	150	100.0 ± 0.0
– independent childbirths	137	86.7 ± 2.7	119	81.0 ± 3.2	130	86.7 ± 2.8
– abdominal (CS) childbirths	3	1.9 ± 1.1	9	6.1 ± 2.0*	2	1.3 ± 0.9
– abdominal (scar on the uterus) childbirths	12	7.6 ± 2.1	11	7.5 ± 2.2	18	12.0 ± 2.7
Very early childbirths	2	1.3 ± 0.9	–	–	–	–
Early childbirths	4	2.5 ± 1.3	3	2.0 ± 1.2	–	–
Premature childbirths	–	–	5	3.4 ± 1.5	–	–
Number of women with complicated childbirths	19	12.0 ± 2.6	32	21.8 ± 3.4	12	8.0 ± 2.2
Types of complications:	23	14.6 ± 2.8	45	30.6 ± 3.8	13	8.7 ± 2.3
– pelvic presentation	2	1.3 ± 0.9	4	2.7 ± 1.3	2	1.3 ± 0.9
– prenatal discharge of amniotic fluid	9	5.7 ± 1.8**	22	15.0 ± 2.9***	6	4.0 ± 1.6
– premature detachment of a normally located placenta	–	–	5	3.4 ± 1.5	–	–
– weakness of birth activity	–	–	1	0.7 ± 0.7	–	–
– hypotonic bleeding	–	–	2	1.4 ± 1.0	–	–
– soft tissue injuries	12	7.6 ± 2.1	8	5.4 ± 1.9	5	3.3 ± 1.5
Postpartum complications (endometritis)	–	–	3	2.0 ± 1.2	–	–

Note: the reliability of the differences between the groups * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3

Outcome of birth for the fetus and newborn (per 100 surveyed)

Indicators	The main groups				Control group	
	I group		II group			
	n = 158		n = 147		n = 150	
	Abs.	M ± m	Abs.	M ± m	Abs.	M ± m
Healthynewborns	149	94.3 ± 1.8***	129	87.8 ± 2.7***	150	100.0 ± 0.0
Condition at birth by Apgar: 8–9 points	140	88.6 ± 2.5***	124	84.4 ± 3.0***	150	100.0 ± 0.0
7–6 points	5	3.2 ± 1.4	5	3.4 ± 1.5	–	–
< 6 points	6	3.8 ± 1.5	4	2.7 ± 1.3	–	–
Stillborns	–	–	1	0.7 ± 0.7	–	–
Averageweightofnewborns	140	88.6 ± 2.5	124	84.4 ± 3.0	136	92.5 ± 2.2
Largechildren	5	3.2 ± 1.4	6	4.1 ± 1.6	11	7.5 ± 2.2
Small children	8	5.1 ± 1.7	7	4.8 ± 1.8	3	2.0 ± 1.2
Congenitalmalformations	–	–	1	0.7 ± 0.7	–	–
Prematurechildren	6	3.8 ± 1.5	8	5.4 ± 1.9	–	–

Note: the reliability of the differences between the groups * p < 0.05, ** p < 0.01, *** p < 0.001.

There were 6 premature infants in the first group of newborns (3.8%) and in the second group (5.4%), the difference was not statistically significant, p > 0.05.

Thus, in the course of the research, we proved that:

1. Complicated pregnancy course was more often detected in the group with gestational pyelonephritis (31.0%) than in the group with chronic pyelonephritis (23.1%). In the control group, pregnancy was complicated significantly less reliable (10.0%) than in the first group t = 4.70, p < 0.001 and in the second comparison group t = 3.05, p = 0.001.

2. In the first group, 2.5 complications occurred in 1 pregnant woman, in the second group – 1.9 detected complications, t = 6.71, p < 0.001, in the control group complications (15 women) were significantly less frequent, in comparison with the first group t = 17.02, p < 0.001 and with the second group – t = 7.12, p < 0.001.

3. Pregnancy with gestational pyelonephritis was complicated: gestational anemia (31.0%), hydramnios (12.0%), oligohydramnios (9.5%), fetoplacental insufficiency (8.2%), threat of miscarriage (7.0%), intrauterine infection (3.8%), hydronephrosis transformation of the kidneys (3.2%), hard preeclampsia (3.2%) and light preeclampsia (1.3%).

4. In the group with chronic pyelonephritis, pregnancy was complicated: gestational anemia (14.3%), threat of miscarriage (5.4%), hard preeclampsia (4.8%), hydronephrosis

transformation of kidneys (4.1%), intrauterine growth retardation (3.4%), partial premature detachment of the placenta (3.4%), fetoplacental insufficiency (2.7%), intrauterine infection (2.7%), oligohydramnios (2.0%), antenatal fetal death (0.7%), and hydramnios (0.7%).

5. Comparison in the first group was significantly more frequent: hydramnios (t = 4.20, p < 0.001), oligohydramnios (t = 2.89, p = 0.004) and fetoplacental insufficiency (t = 2.15, p = 0.03). At the same time in the first group there were no cases of partial plaque detachment, intrauterine growth retardation and antenatal fetal death.

6. Immediate birth was 96.2% of the first group and 94.6% of the second group. In the control group, the pregnancy ended in immediate birth (100%), which was statistically significant with the first group (t = 2.53, p = 0.01) and the second comparison group (= 2.84, p = 0.004).

7. In pregnant women with chronic pyelonephritis, the complications of births were significantly more frequent: 30.6%, than in the first group – 14.6%, t = 3.39, p < 0.001 and control group 8.7%, t = 4.43, p < 0.001. The number of women with complicated births in the first group is 12.0%, in the second group – 21.8%, t = 2.29, p = 0.02, in the control group – 8.0%, which is significantly less than in second group, t = 3.41, p < 0.001.

8. In women with chronic pyelonephritis in the structure of complications: prenatal discharge of amniotic fluid (15.0%), soft tissue

injury (5.4%), premature detachment of the normally located placenta (3.4%), pelvic presentation (2.7%), hypotonic bleeding (1.4%), weakness of birth activity (0.7%), postpartum endometritis (2.0%).

9. The first (94.3%) and the second (87.8%) groups significantly fewer healthy newborns in comparison with the control group ($t = 3.177$, $p = 0.001$ and $t = 4.52$, $p < 0.001$, respectively). When evaluating a newborn children by Apgar, the children in the control group (100.0%) were significantly more likely to have a higher score (8-9 points) than in the first group, 88.6% of children $t = 4.56$, $p < 0.001$ and in the second group 84.4%, $t = 5.20$, $p < 0.001$.

10. Less than 6 points were estimated to 3.8% of children in the first group and 2.7% in the second group. In the second group congenital malformation and stillbirth occurred in 0.7%. Premature children in the first group – 3.8%, in the second – 5.4%.

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