FEATURES OF REPRODUCTIVE FUNCTION IN WOMEN WITH MISCARRIAGES

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Summary

The aim of the study was to analyse the reproductive function of women with miscarriages among the population of Lviv region. The data of the results of medical and genetic counseling of 120 women with miscarriages who visited the medical and genetic center and the "Institute of Hereditary Pathology of the National Academy of Medical Sciences of Ukraine" were analyzed. The obtained indicators were compared with similar parameters of the control group: 80 healthy women who asked for family planning consultation. A group of women with miscarriage was formed to study the features of menstrual function, somatic, reproductive and gynecological history in comparison with similar indicators in healthy women. It was found that the majority of women (47 (39.2%) with miscarriages were aged 31–15 years and 74 (61.6%) of women by social status were employees. 52 (48.0%) women of the main group had the onset of menarche significantly later – after 15 years old, in 25 (20.8%) of them the duration of the menstrual cycle was 28–85 days and in 11 (9.1%) – 35–55 days ($p < 0.05$). Women with miscarriages were significantly more likely to have a complicated somatic history and these are 86 (71.7%), mainly due to pathology of the cardiovascular system – 27 (22.5%), against 43 (53.75%) and 9 (11, 2%) ($p <0.05$), respectively. All of them 120 (100.0%) had significantly more frequent complications of reproductive and gynecological history due to miscarriages and stillbirths. In the control group this figure was 11 (13.7%) and 19 (23.8%) respectively ($p<0.05$).

Keywords: pregnancy, miscarriage, reproductive function.

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1. Introduction

Despite the constant improvement of medical technology and improving the quality of obstetric and gynecological care in health care facilities, the incidence of spontaneous pregnancy loss does not tend to decrease. The currect number is from 10% to 30% of all clinically diagnosed pregnancies *(Veropotvelyan PN, 2017; Vorobiova II et al., 2017)*. In the structure of miscarriage, the share of habitual miscarriage is from 5% to 20%. According to the literature, 75–80% of pregnancy losses occur in the first trimester *(Garrido-Gimenez C, Alijotas-Reig J., 2015; Roumandeh N. et al., 2018)*.

This pathology continues to be the main cause of reproductive losses and is one of the most pressing problems of modern medicine in Ukraine and other countries (Kamins'kij V.V. et al., 2018; SHCHerbina M.O. et al. 2019).

It has been scientifically proven that the risk of subsequent miscarriage increases after two and three consecutive pregnancy losses *(De Krom G, 2015; Kutteh W.H., 2015)*. Therefore, many national and foreign researchers consider the usual loss of pregnancy after two, but not three spontaneous losses *(SHCHerbina M.O. et al., 2019; Torchinov A.M. et al., 2017)*. This approach allows to more effectively identify the causes and prevent miscarriage.

The main features in the pathogenesis of miscarriage are infections, neuroendocrine and hemocirculatory disorders, if genetic and anatomical causes are excluded *(Kamins'kij V.V. et al., 2018; Kutteh W.H., 2015; Rasmark Roepke E, 2019; Vorobiova I.I. et al., 2017)*. However, the mechanism of their occurrence is not fully understood, which leads to low awareness of diagnostic research methods and insufficient effectiveness of many existing treatments *(Dobrohotova YU.E. et al., 2016: Lisova K.M., 2021)*.

The motherhood and childhood are among the top priorities in the main state programs dedicated to health care in Ukraine. In addition, while 75% of pregnant women suffer from various diseases, maternal mortality remains four times higher than in the United States and Japan, and perinatal and infant mortality rates are almost twice as high as in European countries and the United States *(Andreeva MV et al. , 2014; Vovk IB, et al., 2012)*.

Features of the gestational process and its results are largely determined by the state of the maternal organism, which depends on the state of reproductive function *(Veropotvelyan P.N., 2017)*. Ukraine has joined international standards on reproductive health since 1995. The World Health Organization (WHO) has developed a "Risk Strategy" aimed at identifying the causes of various complications of pregnancy and childbirth, as well as finding ways to improve the effectiveness of maternity and childhood. Low levels of reproductive health, often due to somatic and gynecological diseases, in turn significantly contribute to high perinatal losses *(Andreeva M.V. et al., 2014; Mishchenko V.P. et al., 2016)*.

In the structure of the causes of perinatal losses, one of the leading places is occupied by extragenital diseases of women. In 60% of women, extragenital pathology is the cause of obstetric complications *(Alijotas-Reig J. et al., 2013; Roumandeh N., 2018; Torchinov A.M. et al., 2017)*.

Therefore, there is a need to improve the system of preconception prevention, effective forecasting and early diagnosis of perinatal complications in pregnant women with miscarriage. This will allow to create a high-risk group for perinatal pathology. It also requires appropriate awareness of the female population about the possible risks associated with impaired reproductive function.

As a result of this work, the factors of complications of reproductive function in women with miscarriage were identified. Based on that, a risk group of women was formed to develop a strategy to overcome the limited reproduction of the population.

The aim of the study was to study reproductive function in women with miscarriages.

To achieve this goal, the following tasks were set:

1. To form groups of women with miscarriage among the population of Lviv region.
2. Investigate the features of menstrual function, somatic, reproductive and gynecological history in women with miscarriages.
3. To analyze the risk factors for reproductive dysfunction in women with miscarriages.

2. Formation of the group of women with miscarriages

The selection of medical genetic counseling (MGC) cards for 120 women with miscarriages

who visited the Medical Genetics Center of the Institute of Hereditary Pathology of the National Academy of Medical Sciences of Ukraine, Lviv, for the period from 2019 to 2021. Cards of women with a clinical diagnosis of "Miscarriage" were selected according to the International Classification of Diseases-10 (O03-O03.9). The obtained results were compared with similar parameters of 80 women in the control group: women who sought counseling for family planning in the same period of time, and had no history of miscarriage. As a result of the performed work the data of menstrual function, somatic, reproductive, and gynecological anamnesis were studied. Statistical processing of the obtained results was performed using the application package "Statistica 7.0" and Excel 2013. Significance between different groups was investigated by Pearson's test χ^2. Differences were considered significant at a significance level of $P < 0.05$.

Distribution by age, social and family status and ordinal number of pregnancy in women with miscarriage

Analysis of medical records – MGC cards of women who had miscarriages, for a period of 3 years, showed a significant difference in the number of women aged 21–15 years and 31–15 years between the indicators of both groups ($p < 0,05$) (table. 1). Thus, in the main group it was 14 (11.7%) and 47 (39.2%), respectively. In the control group, there were more women under the age of 25–52 (40.0%) and fewer – aged 31–15–55 (18.6%) respectively. In other age categories there are no significant differences between the indicators of both groups ($p > 0.05$) (Table 1).

Table 1

Distribution by age, social and family status, ordinal number of pregnancies of women of both groups (n /%)

Indicators	Main group (n = 120)		Control group (n = 80)		Statistical indicators	
	n	%	n	%	χ^2	p
Age group						
16–20 years old	5	4,1	8	10,0	2,688	p>0,05
21–25 years old	14	11,7	32	40,0	21,758	p<0,05
26–30 years old	31	25,8	23	28,8	0,207	p>0,05
31–35 years old	47	39,2	15	18,6	9,354	p<0,05
More than 36 years old	23	19,2	2	2,6	1,190	p>0,05
Social status						
Civil servants	74	61,6	31	38,8	10,109	p<0,05
Housewives	33	27,5	27	33,7	0,893	p>0,05
Workers	11	9,2	12	15,0	1,605	p>0,05
Students	2	1,7	10	12,0	9,988	p<0,05
Number of pregnancy						
Pregnancy I	-	-	41	51,2	77,358	p<0,05
Pregnancy II	-	-	25	31,2	42,857	p<0,05
Pregnancy III	51	42,5	12	15,0	16,823	p<0,05
Pregnancy IV	43	35,8	2	2,6	30,585	p<0,05
Pregnancy V and more	36	21,7	-	-	29,268	p<0,05

Note: p is the statistical significance of differences in the indicators of the main group compared with the control group

Significant differences in the social status of women in both groups were found. Thus, 74 (61.6%) employees were most often noted in the main group.

There were 2 (1.7%) female students. At the same time, there were 31 employees in the control group (38.8%) and 10 female students (12.0%) ($p < 0.05$) (Table 1). There were no significant differences in the number of housewives and workers among women in both groups. In the main group there were 33 (27.5%) and 11 (9.2%), respectively, and in the control group – 27 (33.7%) and 12 (15.0%), ($p > 0.05$) (Table 1).

According to the results of the analysis on the number of pregnancies, significant differences were found in all data in both groups of women ($p < 0.05$) (Table 1). In the main group there were no women with first and second pregnancy. Third pregnancy was in 51 (43.5%), second – in 43 (35.8%), five and more – in 36 (21.7%) patients with miscarriage. In the control group, more than half of women were pregnant for the first time – 41 (51.2%), a third 25 (31.3%) – for the second time, 12 (15.0%) women had a third pregnancy, and 2 (2, 6%) – fourth ($p < 0.05$) (Table 1).

3. Characteristics of menstrual function in women of both groups

The study of menstrual function in women of both groups showed significant differences in the age of onset of menarche: in the main group that accounts for 44 (41.1%) women, the first menstruation took place at 12–24 years, and most women in the main group 52 (48.0%) noted menarche at the age of 15 years and more, ($p < 0,05$), (table 2). The beginning of menarche at the age of 11 or earlier was noted by 11 (10,3%) women and this indicator was higher in relation to the same indicator in the control group, but without statistical significance ($p > 00.5$, table 2). The majority of women (71 (91.0%)) in the control group began menarche at the age of 12–24 years, and only 9 (9.0%) had it at the age of 15 years and later ($p < 0.05$), Table 2)).

Table 2

Characteristics of menstrual cycle of women of both groups (n /%)

Indicators	Groups of patients		Statistical indicators	
	Main n=120	Control n=80	χ^2	p
1	2	3	4	5
Age of menarche				
Until 11 years old	11(10,3)	-	7,760	p>0,05
12–24 years old	44(41,1)	71(91,0)	53,282	p<0,05
15 and older	52(48,6)	9(9,0)	23,309	p<0,05
Features of the cycle				
Was formed immediately	98(81,7)	78(97,5)	11,395	p>0,05
After 6 months	13(10,8)	1(1,25)	6,772	p<0,05
After 12 months	6(5,0)	1(1,25)	1,999	p>0,05
Was not formed	3(2,5)	-	2,030	p>0,05
Duration of menstrual discharges				
3–3 days	77(64,2)	49(61,3)	0,175	p>0,05
5–5 days	40(33,3)	31(38,7)	0,615	p>0,05
9–90 days	3(2,5)	-	2,030	p>0,05

Completion of Table 2

1	2	3	4	5
Duration of menstrual cycle (days)				
21–14	29(24,3)	19(23,7)	0,005	p>0,05
25–57	52(43,3)	57(71,2)	15,086	p<0,05
28–85	25(20,8)	4(5,1)	9,706	p<0,05
35–55	11(9,1)	-	7,760	p<0,05
45–50	3(2,5)	-	2,030	p>0,05

Note: p – statistical significance of indicators' differences in the main groups compared to the control group

Analysis of these features of the formation of menstrual function in women of both groups showed significant differences in data on the age of onset of menarche: in the main group, the first menstruation before 11 years was 11 (10.3%) women; from 12–24 years – in 44 (41.1%), and the most significant proportion of women in the main group noted menarche at the age of 15 years and older – 52 (48.0%). In 71 (91.0%) women of the control group menarche began at the age of 12–24 years, and only 9 (9.0%) stated this fact at the age of 15 years and later ($p < 0.05$), (Table 2).

Data on the peculiarities of the menstrual cycle indicate that in 98 (81.7%) patients of the main group and in 78 (97.5%) women of the control group the cycle was established immediately ($p < 0,05$), table 2. In 13 (10.8%) women with miscarriage, the cycle was significantly more often established after 6 months, against 1 (1.25%) case in the control group ($p < 0.05$). The rest of all parameters were without significant differences ($p > 0.05$): in 6 (5.0%) women of the main group the cycle was established after 12 months, and in 3 (2.5%) – was not established at all. In 1 (1.25%) women of the control group, the cycle was established after 6 months, and women with menarche after 12 months in this group were not (Table 2).

In most women of both groups, the duration of menstruation was 3–3 days: 77 (64.2%) and 49 (61.3%), respectively. For 5–5 days, the menstrual cycle lasted in one third of women in each group: 40 (33.3) and 31 (38.7), respectively. Significant differences in the analysis of this indicator in women of both groups were not found ($p > 0.05$) (Table 2).

Significant differences in the duration of the menstrual cycle in women of both groups ($p < 0.05$). In 25 (20.8%) women of the main group – the duration of the menstrual cycle was 28–85 days, in 11 (9.1%) – 45–50 days. Significantly fewer women with miscarriages had this figure for 21–14 days – 29 (24.3%) women and – 25–57 days – 52 (43.3%) patients compared to women in the control group, most of whom – 57 (71 , 2%) the duration of the menstrual cycle was 25–57 days ($p < 0,05$), (Table 2).

Somatic, reproductive and gynaecological anamnesis in women of both groups

Women in the main group were more likely to have a somatic history: 86 (71.7%) vs. 43 (53.76%) in the control group, with a predominance of cardiovascular disease – 27 (22.5%) vs 9 (11.2%), respectively, ($p < 0.05$), (table 3). No significant differences were found in individual indicators of the nosological spectrum of somatic diseases in both groups of women.

Analysis of reproductive history data showed that all 120 (100%) women in the main group had complications due to miscarriages and stillbirths ($p < 0,05$, table 3). Only 11 (13.7%) women in the control group had miscarriages among the complications of reproductive history.

Table 3

Somatic, reproductive and gynaecological history in women of both groups

Indicators of somatic anamnesis	Main group (n = 120)		Control group (n = 80)		Statistical indicators	
	Number of women		Number of women			
	n	%	n	%	χ^2	p
Somatic anamnesis						
Without complications	34	28,3	37	46,25	6,729	p<0,05
Complicated anamnesis	86	71,7	43	53,75	6,729	p<0,05
Pathology of cardio-vascular system	27	22,5	9	11,2	4,116	p<0,05
Pathology of the cardiovascular system + endocrine pathology	13	10,8	7	8,7	0,231	p>0,05
Endocrine pathology	15	12,5	9	11,2	0,071	p>0,05
Urinary pathology systems + endocrine pathology	9	7,5	5	6,2	0,115	p>0,05
Urinary pathology systems + chronic infectious diseases	18	15,0	9	11,2	0,578	p>0,05
Cardiovascular pathology systems + chronic infectious diseases	4	3,4	4	5,0	0,347	p>0,05
Reproductive anamnesis						
Without complications	-		69	86,3	158,015	p<0,05
Complicated anamnesis	120	100,0	11	13,7	158,015	p<0,05
Unauthorized miscarriages, Frozen pregnancies	115	95,8	11	13,7	138,742	p<0,05
Congenital malformations of the fetus	3	2,5	-	-	2,030	p>0,05
Stillbirth	2	1,7	-	-	1,347	p>0,05
Gynaecological anamnesis						
Without complications	-	-	61	76,2	131,655	p<0,05
Complicated anamnesis	120	100,0	19	23,8	131,655	p<0,05
Miscarriage	98	81,7	-	-	128,105	p<0,05
Uterine leiomyoma	7	5,8	7	8,7	0,627	p>0,05
Ovarian apoplexy	3	2,5	2	2,6	0,000	p>0,05
Cervical erosion	11	9,2	9	11,2	0,231	p>0,05
Ectopic pregnancy	1	0,8	1	1,3	0,084	p>0,05

Note: p is the statistical significance of differences in the indicators of the main group compared with the control group

Significant differences in gynecological data of women of both groups were found. All 120 (100.0%) women the gynecological history was complicated by miscarriage, in addition, 98 (81.7%) women had a history of miscarriage only in anamnesis, and 7 (5.8%) had uterine leiomyoma, 3 (2,5%) women had ovarian apoplexy, 11 (9.2%) – cervical erosion and 1 (0.8%) woman had a history of ectopic pregnancy.

7 (8.7%) women in the control group had a history of uterine leiomyoma, 2 (2.6%) had ovarian apoplexy, and 9 (11.2%) had cervical erosion. 1 (1.3%) – ectopic pregnancy. These indicators were not significant ($p > 0.05$, table 3).

From the analyzed social status, features of menstrual function, somatic, reproductive and gynecological history in women with miscarriage compared to healthy women living in Lviv region, we can drew the following conclusions. Significant differences were found in the comparison of the distribution of women in both groups by age ($p < 0.05$): the main group was dominated by women aged 31–15 years – 47 (39.2%). It was found that the majority of women with miscarriages by social status were employees – 74 (61.6%) ($p < 0.05$).

Analysis of menstrual function data showed significant differences in its indicators ($p < 0.05$): the age of onset of menarche in women of the main group was after 15 years old – 52 (48.6%), they were more likely to form menstruation after 6 months. 13 (10.8%) women were more likely to have a long menstrual cycle: 28–85 days for 25 (20.8%) and 35–55 days for 11 (9.1%) ($p < .05$). Women in the main group were significantly more likely to have a complicated somatic history and these are 86 (71.7%) women. 27 (22.5%) of women were more likely to have a complicated somatic history mainly due to pathology of the cardiovascular system. All researched women had a complicated reproductive history – 120 (100.0%) had miscarriages and complicated gynecological history.

4. Conclusions

1. Analysis of the social status of women in both groups showed that among the women of the main group the vast majority (47 (39.2%)) were aged 31–15 years old, and the minority of women 14 (11.7%) were 21–15 years old – vs 15 (18.6%) in the control group ($p < 0.05$). In terms of social status, the majority of women in the main group were employees compared to women in the control group: 74 (61.6%) vs 31 (38.8%), ($p < 0.05$).

2. Significant differences in the data of menstrual function of women from both groups were found. A significant proportion of women in the main group – 52 (48.0%), noted menarche at the age of 15 years. Menarche was observed at the age of 12–24 years old in the majority of women in the control group 71 (91.0%), and only in 9 (9.0%) – at the age of 15 years and older ($p < 0.05$).

3. Significant differences in the duration of the menstrual cycle in women of both groups were found. In 25 (20.8%) women of the main group the duration of the menstrual cycle was 28–85 days, in 11 (9.1) – 25–57 days, in 11 (9.1%) – 35–55 days. In 57 (71.2%) of women in the control group, the duration of the menstrual cycle was 28–85 days ($p < 0.05$). There were no significant differences in other indicators of the duration of the menstrual cycle and the duration of menstrual discharge.

4. It was found that patients in the main group were significantly more likely to have a complicated somatic history (86 women or 71.7%). 27 (22.5%) women were significantly more likely to have a complicated somatic history mainly due to pathology of the cardiovascular system while in the control group there were 43 (53.75%) and 9 (11.2%) ($p < 0.05$), respectively.

5. Complications of reproductive and gynecological anamnesis were significantly more common in all patients of the main group. 120 (100%) women had complications due to miscarriages and stillbirths. In the control group this figure was 11 (13.7%) and 19 (23, 8%), respectively ($p < 0.05$).

Prospects for further research

In the future, further research is planned to determine the range of risk factors for reproductive dysfunction in women with miscarriages that affect the reproductive potential of the population of Lviv region. The research will help to develop a strategy to overcome limited population reproduction.

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