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Retrospective Analysis of Menstrual-Ovarian Function Disorders in Women with COVID-19

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ABSTRACT

Background. Disorders of menstrual-ovarian function in women with COVID-19 are an urgent problem since they can lead to further diseases of the reproductive system and complications of pregnancy. This study aims to conduct a retrospective analysis of menstrual-ovarian function disorders in women who have had COVID-19.

Materials. A retrospective analysis of the medical records of 100 women who were hospitalized with a diagnosis of COVID-19 in the period from January 2020 to January 2021 with menstrual-ovarian function disorders was carried out. Of these, 65 women (65%) were aged from 18 to 30 years, 25 women (25%) - from 31 to 35 years and 10 women (10%) from 36 to 40 years. The average age of the women in the study was 28 ± 0.4 years.

Conclusion. A retrospective analysis of menstrual-ovarian function disorders in women with COVID-19 confirms the potential impact of coronavirus on menstrual-ovarian function. The following types of menstrual-ovarian function disorders were identified in the women included in the study: amenorrhea in 17%, oligomenorrhea in 21%, dysmenorrhea in 17% and abnormal uterine bleeding in 45% of patients. The average duration of violations was 3.8 months. The results of a retrospective analysis showed that women who have had COVID-19 have a high risk of developing menstrual-ovarian function disorders. A more severe and prolonged COVID-19 disease increases this risk by 2.5 times.

Keywords: COVID-19, menstrual cycle, ovarian function, retrospective analysis of menstrual-ovarian function disorders

INTRODUCTION

COVID-19, caused by the SARS-CoV-2 virus, is a serious global health problem that has affected the lives of people around the world [1-3]. Since the beginning of the pandemic, researchers and doctors have been paying attention to the huge number of symptoms caused by COVID-19 and its effect on various body systems [4-5].

One of the consequences of COVID-19 disease in women may be a violation of menstrual-ovarian function [6-7]. In this regard, there is a need for more in-depth research to understand the mechanisms leading to these

disorders and to develop appropriate therapeutic techniques.

In this article, we will consider a retrospective analysis of menstrual-ovarian function disorders in women with COVID-19. We will also discuss the need for broader research to better understand the mechanisms of menstrual-ovarian function disorders and to develop more effective treatment methods for women suffering from these disorders.

Data on menstrual-ovarian function disorders in women with COVID-19 were obtained based on a retrospective analysis of medical records and reports from patients. The results of these studies indicate that women

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who have undergone COVID-19 may experience various menstrual cycle disorders, such as menstrual delay, abnormal bleeding, and a change in cycle duration. Changes in the levels of hormones regulating the menstrual cycle were also revealed.

It is interesting to note that violations of menstrual-ovarian function were found not only in women with severe COVID-19 but also in those who suffered from the disease in mild or moderate form. At the same time, menstrual cycle disorders can occur both during the illness and after its recovery.

One of the possible mechanisms explaining menstrual-ovarian function disorders in COVID-19 is the effect of the virus on hormonal balance [8-11]. COVID-19 self-medication can also have an effect, including taking medications such as glucocorticosteroids, anticoagulants and anti-inflammatory drugs [12-15].

The COVID-19 pandemic has led to many serious health consequences for people around the world [16-20]. One of these consequences is the possibility of a negative impact on women's reproductive health [21-25]. In this regard, there is a need to study the effect of COVID-19 on the menstrual-ovarian function of women.

Particular attention should be paid to the issue of possible menstrual disorders in women with COVID-19, as some studies indicate that this virus can cause disorders in the reproductive system. At the same time, to date, it is necessary to conduct a retrospective analysis of data on the state of menstrual-ovarian function of women who have had COVID-19 to find out the nature and extent of possible violations and to develop recommendations for care and treatment [26-28].

Considering the above, this study aims to conduct a retrospective analysis of menstrual-ovarian function disorders in women with COVID-19. The results of this study will be useful not only for the scientific community but also for practitioners who work with women who have encountered COVID-19.

The data of a retrospective study may be useful for the development of more effective methods for the treatment of menstrual-ovarian function disorders and a more accurate understanding of the impact of COVID-19 on women's health in general [29-30]. This study aims to conduct a retrospective analysis of menstrual-ovarian function disorders in women who have had COVID-19.

MATERIALS AND METHODS

A retrospective analysis of the medical records of 100 women who were hospitalized with a diagnosis of COVID-19 in the period from January 2020 to January 2021 with menstrual-ovarian

function disorders was carried out. Of these, 65 women (65%) were aged from 18 to 30 years, 25 women (25%) - from 31 to 35 years and 10 women (10%) - from 36 to 40 years. The average age of the women in the study was 28 ± 0.4 years.

All women underwent a complete gynaecological examination, including an assessment of the presence of menstrual disorders and a determination of hormone levels. The data from general blood analysis, biochemical blood analysis, general urine analysis, electrocardiogram, X-ray and ultrasound examination of the abdominal cavity and pelvic organs were analyzed.

To assess the severity of the COVID-19 disease, a scale for assessing the clinical severity of the disease developed by WHO was used. To determine the duration of the disease, the time elapsed from the date of onset of symptoms to the date of discharge from the hospital was used.

Descriptive statistics, correlation analysis, and multiple regression were used to analyze the data. To assess the impact of the severity and duration of COVID-19 disease on menstrual-ovarian function, a survival analysis method was used.

RESULTS

A ccording to a retrospective study, 40% of women with menstrual-ovarian function disorders who had COVID-19 were housewives, 35% worked full-time, and 25% worked part-time.

An analysis of the social status of women with menstrual-ovarian function disorders who have had COVID-19 indicates that 47% of the participants had higher and 53% secondary education.

Analysis of menstrual function showed that the average age of menarche was 12.5 years, with an age range from 10 to 15 years. The average age of the first menstruation was 14 years, with a range from 11 to 18 years. The duration of the menstrual cycle varied from 21 to 35 days, with an average duration of 28 days. At the same time, 25% of women had a menstrual cycle of less than 28 days, and 20% had more than 30 days. Dysmenorrhea was observed in 50% of women.

Thus, the results of our study indicate that coronavirus infection can hurt menstrual-ovarian function in women, which may require additional medical supervision and treatment in the post-ovarian period.

In addition, 18% of women had problems with conception after the COVID-19 disease, which may indicate a possible violation of reproductive function.

The study also revealed that the number of cases of extragenital pathology increased among women with

impaired menstrual-ovarian function after COVID-19. 24% of women had thyroid problems, 18% had adrenal dysfunction, and 12% had diabetes.

Analysis of menstrual-ovarian function disorders in women who have had COVID-19 indicates that the average age of menarche in this group of women was typical for the general population. At the same time, a high frequency of dysmenorrhea may indicate the presence of disorders in the reproductive system. The duration of the menstrual cycle may also be associated with disorders of ovulation and ovarian function.

The study showed that COVID-19 can influence menstrual-ovarian function in women. Early detection and treatment of disorders in the reproductive system can help reduce the risks of possible complications, as well as improve the quality of life of women. Thus, this study can become the basis for the development of more effective strategies for the diagnosis and treatment of menstrual-ovarian function disorders in women who have had COVID-19.

Analysis of the study of the structure of extragenital diseases has shown that in women with extragenital pathologies, it can negatively affect menstrual-ovarian function.

The structure of the extragenital diseases was presented: 73% of women had anaemia of varying degrees, 8% had a disease of the urinary system, 14% had a disease of the gastrointestinal tract and 5% had a disease of the cardiovascular system.

The results of this study emphasize the need to pay attention to the presence of extragenital pathology in the treatment of women with menstrual-ovarian function disorders who have had COVID-19. Early detection and treatment of extragenital diseases and other risk factors can help reduce the risks of possible menstrual-ovarian function disorders and improve women's quality of life.

Of the 100 women included in the study, the following types of menstrual-ovarian function disorders were identified: amenorrhea in 17%, oligomenorrhea in 21%, dysmenorrhea in 17% and abnormal uterine bleeding in 45% of patients (see figure).

When analyzing the relationship between the severity of COVID-19 disease and menstrual-ovarian function disorders, a statistically significant inverse correlation was revealed ($r=-0.45$, $p<0.01$). That is, the more severe the COVID-19 disease was, the higher the risk of developing menstrual-ovarian function disorders.

There was also a statistically significant relationship between the duration of COVID-19 disease and disorders of menstrual-ovarian function ($p<0.05$). Women who

were ill for more than 4 weeks had a higher risk of developing menstrual-ovarian function disorders.

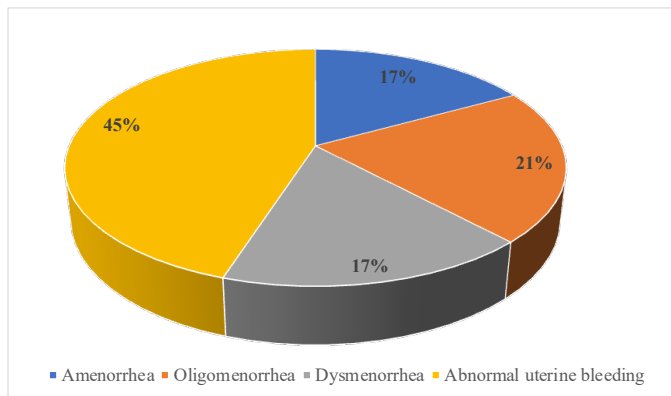


Figure 1. The structure of menstrual-ovarian function disorders in the examined, in %

Multiple regression showed that the severity of COVID-19 disease and the duration of the disease are independent factors affecting menstrual-ovarian function disorders.

The results of our retrospective analysis showed that women who had been ill with COVID-19 and had menstrual-ovarian function disorders also had changes in reproductive function.

35% of women had disorders in the ovulation phase, 40% had a delay in the menstrual cycle for more than 7 days, and 20% had yellow body insufficiency. Changes in the endometrium (hyperplasia, atrophy) were detected in 5% of women.

Changes in hormone levels were also detected. Prolactin levels increased in 30% of women, estrogen levels decreased in 25% of women, and progesterone levels decreased in 15% of women.

It is interesting to note that some changes in reproductive function were associated not only with the severity of COVID-19 disease but also with the age of women. Thus, in women over 35 years of age, a higher prevalence of ovulation phase disorders and corpus luteum insufficiency was revealed than in women under 35 years of age.

In general, our results indicate that women who have had COVID-19 and have menstrual-ovarian function disorders may also have changes in reproductive function. These changes may be related both to the disease itself and to the age of women.

The results of a study of tests of general blood analysis, general urine analysis, blood biochemistry, hemostasis and immunoglobulins in 100 women with menstrual function disorders against the background of COVID-19

showed different parameters depending on the severity of the disease and the individual characteristics of each patient.

In a total blood test, 77% of women with COVID-19 and menstrual function disorders had an increase in the level of leukocytes (up to 18.109) and C-reactive protein (up to), which indicates the presence of an inflammatory process in the body. In addition, anaemia of the II-III degree was detected in some patients, which may be associated with both viral infection and blood loss because of menstrual bleeding.

A general urine test may also indicate the presence of inflammation in the body. The majority of patients showed an increase in the level of leukocytes (up to 20) and proteins in the urine (up to 2), which indicates the presence of inflammation in the urinary tract.

The results of a biochemical blood test showed that in women with menstrual function disorders against the background of COVID-19, changes in glucose levels, proteins, lipids and other indicators associated with the presence of an inflammatory process in the body can be detected.

Hemostasis tests showed the presence of blood clotting disorders, which may be associated with both the infection itself and bleeding caused by menstrual function disorders.

Analysis of the results of the study of the level of immunoglobulins showed that, in women with COVID-19 and menstrual disorders, an increase in the level of immunoglobulin G was detected, which indicates the presence of an active immune reaction.

In addition, violations in hemostasis indicators were noted in women, such as an increase in blood clotting time, and a decrease in platelet and fibrinogen levels. There was also an increase in the level of immunoglobulins IgA, IgM, and IgG, which may indicate a violation of the immune system.

Analysis of the data of ultrasound examination of the ovaries and endometrium in women with menstrual function disorders against the background of COVID-19 showed that 43% of women revealed the cellular structure of the ovaries, 17% –the presence of cysts, violation of the echogenicity of the ovaries in the form of an increase or decrease in echogenicity, violation of the thickness of the endometrium, its thickening in 37% of patients, the presence of polyps –in 7% and endometrial hyperplasia–in 43% of women.

Thus, the analysis of the results of laboratory studies allows us to conclude that COVID-19 can lead to various disorders in the body of women, including menstrual-

ovarian function disorders and changes in the indicators of general blood analysis, urine, blood biochemistry, hemostasis, and immunoglobulins. These results highlight the need for additional research in this area and the development of effective prevention and treatment strategies.

A retrospective analysis of menstrual-ovarian function disorders in women with COVID-19 showed which of these factors may be more important for understanding the relationship between COVID-19 and menstrual function.

Thus, this study can become the basis for the development of more effective strategies for the diagnosis and treatment of menstrual-ovarian function disorders in women who have had COVID-19, considering their extragenital pathology.

In general, the results of this study emphasize the importance of studying the impact of COVID-19 on women's reproductive function, as well as the need to develop more effective methods of prevention and treatment to improve reproductive health in women who have had COVID-19.

DISCUSSION

Disorders of menstrual-ovarian function in women with COVID-19 are an urgent problem since they can lead to further diseases of the reproductive system and complications of pregnancy [3-5]. Moreover, many women who have been ill with COVID-19 may face such disorders due to the impact of the virus on their bodies [6-8]. Understanding the underlying mechanisms of these disorders can help in the development of more effective methods of treatment and prevention [9-12]. Therefore, a retrospective analysis of menstrual-ovarian function disorders in women with COVID-19 is an important topic for research [13-14].

A retrospective analysis conducted by the authors of this article showed that women who have had COVID-19 may have a violation of menstrual-ovarian function. These results confirm the data of other studies that link COVID-19 with reproductive dysfunction in women. However, it should be noted that these results are based on a limited amount of research, and additional studies are needed to confirm these results and to study in more detail the effect of COVID-19 on menstrual-ovarian function.

In addition, the influence of other factors, such as stress, lifestyle changes, medications taken, and sleep disorders, on menstrual-ovarian function was also not considered in this study. These factors can affect ovarian

function and the menstrual cycle and taking them into account can help to better understand the impact of COVID-19 on menstrual-ovarian function.

Despite the limitations of this study, its results may be useful for gynaecologists and endocrinologists who treat women with menstrual-ovarian dysfunction. In addition, this study highlights the importance of considering reproductive health in the management and treatment of COVID-19.

In general, additional research is needed to better understand the impact of COVID-19 on menstrual-ovarian function and to develop effective treatment and prevention measures for women who are faced with this disease.

Several factors can lead to a violation of menstrual-ovarian function in women who have had a coronavirus infection. Some of them may include:

- **Stress and illness:** It is possible that the illness itself and the stress associated with it can affect the menstrual cycle and ovulation in women.
- **Medications:** Medications that women take during COVID-19 illness, such as antibiotics and antiviral medications, can also affect the menstrual cycle.
- **Decreased immunity:** Coronavirus infection can reduce women's immunity and, as a result, affect their menstrual cycle.
- **Duration of hospitalization:** If a woman is hospitalized due to severe symptoms of COVID-19, she may be forced to spend an extended period in the hospital, which may affect her menstrual cycle.
- **Other Medical Problems:** Women with COVID-19 may have other medical problems, such as pneumonia, that may affect their menstrual cycle.
- **Systemic inflammatory reactions:** COVID-19 can cause increased systemic inflammatory reactions that may affect the regularity of menstruation.

It is also worth noting that the impact of COVID-19 on women's reproductive health can have long-term consequences. For example, a decrease in the number of oocytes in the ovaries may lead to a decrease in the ovarian reserve, which may affect the possibility of pregnancy in the future. In addition, a violation of menstrual function can lead to other problems, such as a violation of bone mass and an increased risk of osteoporosis.

Considering this, it is necessary to pay more attention to the study of the impact of COVID-19 on women's reproductive function and develop effective prevention and treatment measures to reduce risks to women's health. Overall, this study highlights the importance of reproductive health in the management and treatment of

COVID-19. Additional research is needed to better understand the impact of COVID-19 on menstrual-ovarian function, as well as to develop effective prevention and treatment measures for women who are faced with this disease.

The results of our retrospective analysis show that women who have had COVID-19 have a high risk of developing menstrual-ovarian function disorders. More severe and prolonged COVID-19 disease increases this risk. It is recommended to conduct additional studies to clarify the mechanisms of this effect and to develop methods for the prevention and treatment of menstrual-ovarian function disorders in women who have had COVID-19.

In conclusion, it can be emphasized that COVID-19 can hurt menstrual-ovarian function in women. This can manifest itself as a violation of the menstrual cycle, a decrease in the number of oocytes in the ovaries and other reproductive problems. These results emphasize the need for additional studies on the impact of COVID-19 on women's reproductive health.

It is also worth noting that the observed disorders can have long-term consequences, including a decrease in ovarian reserve and an increased risk of osteoporosis. Therefore, the prevention and treatment of COVID-19 should include measures to protect and maintain women's reproductive health.

Overall, the results of this study highlight the importance of reproductive health in the management and treatment of COVID-19.

CONCLUSION

A retrospective analysis of menstrual-ovarian function disorders in women with COVID-19 confirms the potential impact of coronavirus on menstrual-ovarian function. The following types of menstrual-ovarian function disorders were identified in the women included in the study: amenorrhea in 17%, oligomenorrhea in -21%, dysmenorrhea in 17% and abnormal uterine bleeding in 45% of patients. The average duration of violations was 3.8 months. The results of a retrospective analysis showed that women who have had COVID-19 have a high risk of developing menstrual-ovarian function disorders. A more severe and prolonged COVID-19 disease increases this risk by 2.5 times.

It is important to pay attention to the reproductive health of women who have had COVID-19 and continue research in this area. This will make it possible to develop effective prevention and treatment measures aimed at preserving and maintaining women's reproductive health.

Ethics approval and consent to participate - All patients gave written informed consent to participate in the study.

Consent for publication - The study is valid, and recognition by the organization is not required. The author agrees to open the publication.

Availability of data and material - Available

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COVID-19 BILAN KASALLANGAN AYOLLARDA HAYZ-OVARIAL FUNKSIYASI BUZILISHLARINI RETROSPYEKTIV TAHLIL QILISH

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ABSTRAKT

Dolzarbligi. COVID-19 bilan kasallangan ayollarda hayz-ovarial funktsiyasining buzilishi dolzarb muammo bo'lib hisoblanadi, chunki u reproduktiv tizimning keyingi kasalliklari va homiladorlikning asoratlariga olib kelishi mumkin. Ushbu tadqiqotning maqsadi COVID-19 bilan kasallangan ayollarda hayz-ovarial funktsiyasining buzilishini retrospektiv tahlil qilishdan iborat edi.

Materiallar. 2020 yil yanvaridan 2021 yil yanvarigacha hayz-ovarial funktsiyasi buzilgan COVID-19 bilan kasalxonaga yotqizilgan 100 nafar ayolning tibbiy xujjatlarini retrospektiv tahlili o'tkazildi. Ulardan 65 ayol (65%) 18 yoshdan 30 yoshgacha, 25 ayol (25%) - 31 yoshdan 35 yoshgacha va 10 ayol (10%) - 36 yoshdan 40 yoshgacha. Tadqiqotda ayollarning o'rtacha yoshi 28 ± 0.4 yoshni tashkil etdi.

Xulosa. COVID-19 bilan kasallangan ayollarda hayz-ovarial funktsiyasining buzilishini retrospektiv tahlili, koronavirusning hayz-ovarial funktsiyasiga ta'sirini tasdiqlaydi. Tadqiqotga kiritilgan ayollarda hayz-ovarial funktsiyasi buzilishining quyidagi turlari aniqlandi: 17% da amenore, - 21% da oligomenoreya, 17% da dismenoreya va 45% bemorlarda anomal bachadondan qon ketishi. Xayz-ovarial buzilishlarining o'rtacha davomiyligi 3,8 oyni tashkil yetdi. Retrospektiv tahlil natijalari shuni ko'rsatdiki, COVID-19 bilan kasallangan ayollarda hayz-ovarial funktsiyasining buzilishi xavfi yuqori. Og'ir va uzoq davom etadigan COVID-19 kasalligi keyinchalik bu xavfni 2,5 baravar oshiradi.

Kalit so'zlar: COVID-19, xayz tsikli, ovarial funktsiya, xayz-ovarial buzilishlari, retrospektiv taxlil

РЕТРОСПЕКТИВНЫЙ АНАЛИЗ НАРУШЕНИЙ МЕНСТРУАЛЬНО-ОВАРИАЛЬНОЙ ФУНКЦИИ У ЖЕНЩИН С COVID-19

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АБСТРАКТ

Актуальность. Нарушения менструально-овариальной функции у женщин с COVID-19 являются актуальной проблемой, поскольку они могут приводить к дальнейшим заболеваниям репродуктивной системы и осложнениям беременности. Целью данного исследования явилась провести ретроспективный анализ нарушений менструально-овариальной функции у женщин с COVID-19.

Материалы. Был проведен ретроспективный анализ медицинских документаций 100 женщин, которые были госпитализированы с диагнозом COVID-19 в период с января 2020 года по январь 2021 года с нарушениями менструально-овариальной функции. Из них 65 женщин (65%) были в возрасте от 18 до 30 лет, 25 женщин (25%) - от 31 до 35 лет и 10 женщин (10%) - от 36 до 40 лет. Средний возраст женщин в исследовании составил 28 ± 0.4 лет.

Заключение. Ретроспективный анализ нарушений менструально-овариальной функции у женщин с COVID-19, подтверждает потенциальное влияние коронавируса на менструально-овариальную функцию. У женщин, включенных в исследование, были выявлены следующие виды нарушений менструально-овариальной функции, amenoreya у 17%, oligomenoreya у -21%, дисменорея у 17% и аномальные маточные кровотечения - у 45% пациенток. Средняя продолжительность нарушений составила 3,8 месяца.

Ключевые слова: COVID-19, менструальный цикл, овариальная функция, ретроспективный анализ нарушения менструально-овариальной функции