

The Effect of COVID-19 on Menstrual Cycle of Women of Child-Bearing Age

Muhammad Furqan Anwar Ghumman¹, Shafaq Saleem², Saima Bibi³, Attiq Ur Rehman⁴,
Kashif Tousif⁵, Umaira Ali⁶

^{1,2,4,5}Medical Student, Department of Community Medicine, Rawalpindi Medical University, Rawalpindi

³Assistant Professor, Department of Obstetrics & Gynecology, Holy Family Hospital, Rawalpindi

⁶Post-Graduate Trainee, Department of Community Medicine, Rawalpindi Medical University, Rawalpindi

Correspondence: Dr. Muhammad Furqan Anwar Ghumman
Medical Student,
Rawalpindi Medical University, Rawalpindi
Email: getfurqananwar@gmail.com

Abstract

Objective: The objective of this study was to investigate the effect of COVID-19 on the menstrual cycle of women of childbearing age.

Methodology: An analytical cross-sectional study was conducted on females of reproductive age, specifically aged between 15 and 49 years, residing in the twin cities of Rawalpindi and Islamabad from January 2022 to June 2022. Informed consent was obtained from each participant before data collection. A structured questionnaire was administered to gather relevant data, and SPSS version 26 was employed for data analysis. A significance level of 0.05 was used for all statistical tests. The outcome variables included the frequency of menstrual cycle changes, such as increased and decreased menstrual cycle length, dysmenorrhea, decreased menstrual volume, menorrhagia, and intermittent bleeding. These variables were further analyzed for their association with relevant demographic factors, including age, location, occupation, marital status, and number of children.

Results: Out of the total 297 women, 127 (42.8%) reported experiencing changes in their menstrual cycle. Among them, 59 reported an increase in cycle length, 41 reported hypomenorrhea, and only 9 observed inter-menstrual bleeding. The associations of these menstrual cycle changes were found to be significant with age, occupation, marital status, and number of children (p-value < 0.05)

Conclusion: This study concludes that COVID-19 infection does have an impact on women's menstrual cycles, potentially affecting female reproductive health in various ways. The findings emphasize the need to consider the reproductive health aspect of coronavirus infections, especially given the continuous evolution of the virus and the likelihood of successive waves of COVID-19 infections.

Keywords: Menstrual cycle, COVID-19, reproductive health, hypomenorrhea.

Cite this article as: Anwar Ghumman MF, Saleem S, Bibi S, Rehman AU, Tousif K, Ali U. The Effect of COVID-19 on Menstrual Cycle of Women of Child-Bearing Age. J Soc Obstet Gynaecol Pak. 2023; 13(2):114-119.

Introduction

In December 2019, COVID-19 rapidly spread to different parts of the world. The World Health Organization (WHO) declared COVID-19 a pandemic on 11 March 2020 due to its rapid spread and emergency situation.¹ As of 23rd March 2022, the COVID-19 pandemic has infected 474,693,725 people and claimed the lives of more than 6.1 million people worldwide. In Pakistan alone, the virus has infected 1,522,862 people and resulted in over 30,000 deaths.² This pandemic has taken a great toll on the world's healthcare, economy, and businesses. Moreover, it not only affects the

respiratory system but also has many other physical and mental health implications, including potential effects on menstrual cycles.

The media has been circulating news about long COVID-19, suggesting possible long-term effects of the virus, including menstrual dysfunction.³ There have been numerous reports of women experiencing menstrual abnormalities even after recovering from COVID-19 infection.^{4, 5, 7}

Authorship Contribution: ^{1,3,5}Substantial contributions to the conception or design of the work, acquisition, analysis, or interpretation of data for the work,^{2,6}Drafting the work or revising it critically for important intellectual content, Final approval of the version to be published,⁴Active participation in active methodology.

Funding Source: none
Conflict of Interest: none

Received: Dec 28, 2022
Accepted: April 24, 2023

COVID-19 has an impact on every individual. People have suffered many health and social issues. They have limited social gathering and confinement to one's home. Many researches are conducted to dig out the problems people faced and suffered in COVID pandemic.^{8, 9, 10, 11}

According to a study done in patients hospitalized in Tongji Hospital in China, out of 177 COVID-19 patients, 25% patients presented with menstrual volume changes and 28% reported menstrual cycle changes. 20% had decreased volume and 19% patients reported prolonged menstrual cycle.⁵ Similarly, another study showed an upsurge in premenstrual dysphoric disorder and premenstrual syndrome during COVID-19 pandemic.⁶

Even a research was conducted on the impact of COVID-19 on menstrual health of females in which the participants were approached via social media to target a bigger audience and to abide by the precaution of social distance.⁷ While some sources are relating it to pandemic stress, still we do not know the exact etiology as to why and how COVID is causing these symptoms, and how much population is at risk of developing menstrual cycle changes.⁷

Menstrual cycle is a measure of reproductive health of a female. Menstruation is associated with various mental health outcomes and menstrual irregularities with various metabolic disorders. It was found that the women with irregular menstrual cycles had both higher triglyceride levels and higher prevalence of dyslipidemia. Also, they had increased risk of DM and pre-DM.¹²

Since women do not openly talk about their menstrual cycle and hygiene in Pakistan¹³, menstrual dysfunction may be severely affecting the lifestyles of many women in Pakistan, and more or less, the whole world.

The aim of this research is to explore the influence of COVID-19 on the menstrual cycle in females. Gaining a comprehensive understanding of how COVID-19 affects the menstrual cycle is of paramount importance, as it provides an indicator of female reproductive health. Disruptions in the menstrual cycle can potentially heighten the susceptibility to various mental, menstrual, and metabolic disorders. Therefore, this study aims to provide valuable insights that can aid in the identification and mitigation of such risks.

By exploring the etiologies of these effects, this research aims to develop more effective strategies and plans to address any adverse consequences. Additionally, it seeks to enhance our comprehension of COVID-19 and its implications on women's overall well-being, including

menstrual, reproductive, and sexual health. Consequently, the findings from this study can play a significant role in improving the lifestyle and health of women worldwide.

Given the potential global impact, this research is of great importance, as it can provide valuable data regarding an important complication of COVID-19 that may affect a large population of women across the globe.

Methodology

An analytical cross-sectional study was conducted among women of child-bearing age in Rawalpindi and Islamabad after obtaining the ethical approval from the Institutional Review Board (IRB) of Rawalpindi Medical University (Obs/Gynae-1/HFH/RMU/64) for conducting the research from January 2022 to June 2022. The study participants included patients admitted in Gynecology OPD and ward of Holy Family Hospital, their relatives, researchers' friends and relatives who recovered from COVID-19 infection. The study population was the females in their reproductive age i.e., 15 to 49 years. Any female with age of 15 to 49 years and, history of COVID-19 infection and recovery, was approached and the questionnaire was filled by the researcher after asking questions from the participant. The informed consent was taken and the participants were cleared of any misconception or confusion they might have regarding any question.

The sample size calculated by using WHO sample size calculator was 289 using our reference study.⁵ 297 responses were analyzed to increase the validity of our results. Convenience non-probability sampling was used as sampling technique.

A 10-items questionnaire was made on Google Forms to be filled by the participants. The questionnaire was self-made and contained questions regarding the demographic profile i.e., age, location (urban/rural), occupation, marital status and parity. Lastly 5 questions were asked to assess menstrual cycle changes in participants. The questions included how many months prior did they get COVID-19, association with PMS, normal menstrual cycle length, any change in menstrual cycle observed and the change that was observed i.e., cycle lengthened, shortened; decreased menstrual volume, increased menstrual volume and/or intermittent bleeding. The participants could select more than one change. The outcome variables were the frequency of the menstrual cycle changes (i.e., increased menstrual

Table I: Demographic details of participants.

		N	%
Age	18-28	243	81.8%
	29-39	39	13.1%
	Above 39	15	5.1%
Location	Urban	269	90.6%
	Rural	28	9.4%
Occupation	Healthcare Worker	77	25.9%
	House Wife	26	8.8%
	Student	154	51.9%
	Corporate Job	22	7.4%
	Other	18	6.1%
Marital Status	Married	68	22.9%
	Unmarried	229	77.1%
Parity	No children	255	85.9%
	1-3	35	11.8%
	More than 3	7	2.4%

cycle length, shortened menstrual cycle length, dysmenorrhea, decreased menstrual volume, menorrhagia and intermittent bleeding) and its association with the relevant demographics i.e., age, location, occupation, marital status and the number of children. The data was collected using a 10-item self-administered questionnaire. The questionnaire was printed in hard copy. The participants were approached and were asked to fill the form.

A sample of 297 questionnaires was selected for analysis in this study. The data obtained from the questionnaires was subjected to statistical analysis using SPSS version 26 (Statistical Package for Social Sciences). Descriptive statistics were employed to summarize the data.

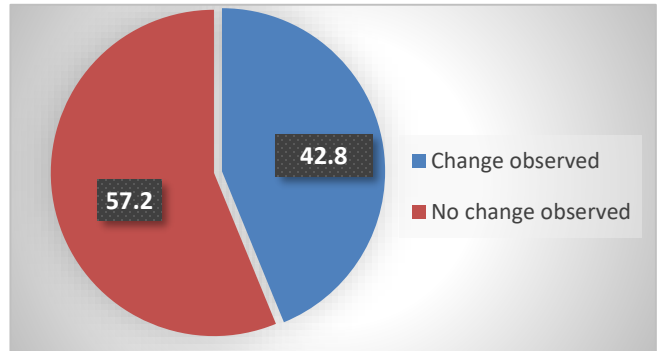
To explore the association between menstrual cycle changes and demographic variables, the Pearson Chi-Square test was utilized. A significance level of 0.05 or lower was considered to determine statistical significance in the analysis.

Results

After omitting responses with inaccurate or incomplete data, we analyzed a total of 297 responses with age ranging from 18 years old to above 39 where most of the participants (81.8%) were in the 18-28 age group (n=243). Most of the respondents were from the urban area (90.6%, n=269). Occupation of the respondents was varied where most of the respondents were students (51.9%, n=154). 68 respondents were married (22.9%) while number of unmarried women was 229 (77.1%). Most of the participants had no children (85.9%, n=255) while only few had more than 3 children (2.4%, n=7). 43.1% (n=128) had COVID infection more

than 6 months back. Remaining details about the demographics are shown in table I.

Figure 1 depicts the percentage of participants who



reported changes in menstrual cycle (42.8%) and those who did not experience any changes (57.2%) after recovering from COVID-19 infection.

Figure 1. Change in Menstrual cycle observed

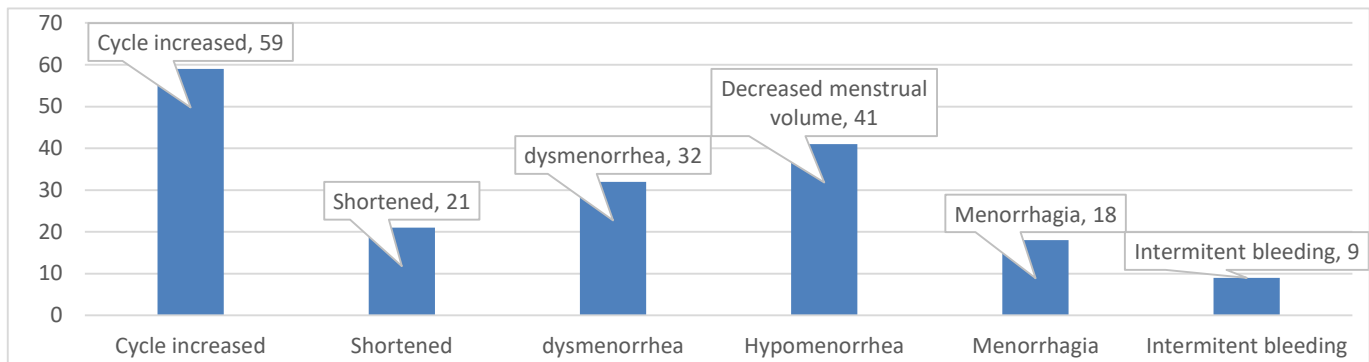
Out of 297 total participants, most of the participants (89.9%, n=267) reported having normal menstrual cycle length from 28 to 32 days while 27 (9.1%) reported a menstrual cycle length of 32 to 37 days. Only a few (1%, n=3) reported routine menstrual cycle of more than 37 days.

Out of 127 participants with observed changes in menstrual cycle, 59(46.46%) reported lengthened duration of menstrual cycle while 21 (16.5%) reported shortened menstrual cycle duration. Frequencies of various changes observed are shown in figure 2.

Among the 127 participants who reported changes in menstrual cycle, Figure 2 illustrates that 46.46% observed a lengthened duration, while 16.5% reported a shortened menstrual cycle duration. The frequencies of other observed changes are also presented in the figure.

Participants were also asked if they observed any changes in PMS (Post-Menstrual Syndrome) symptoms. 200 (67.3%) chose no change observed while 83 (27.9%) reported they had worsened PMS symptoms following COVID-19 infection. Interestingly, 4.7% (n=14) also reported they had improved PMS symptoms following COVID-19 infection.

The study reveals a significant association between COVID infection and menstrual abnormalities in women, with these abnormalities showing a correlation with various demographic profiles. Notably, the observed menstrual cycle changes were significantly associated with the participants' age (p=0.008). Occupation also displayed a strong association, with housewives



showing the highest incidence of menstrual cycle changes (73.1%, n=19) compared to other occupations (p=0.004). Furthermore, marital status significantly influenced the occurrence of menstrual changes (p=0.001), as 60.3% (n=41) of married women reported changes in menstrual cycle compared to 37.6% (n=86) of unmarried women. Detailed inferential statistics can be found in Table II.

Table II: Association of variables with menstrual cycle changes observed

Variables	p value
Age	0.008*
Location (Urban/Rural)	0.224
Occupation	0.004*
Marital status	0.001*
Number of children	0.001*

*p-value<0.05 is considered significant.

Discussion

Menstruation is a natural process that is regulated by ovaries. It is very prone to changes attributable to infections, medications, psychiatric stresses and other forms of organ dysfunctions. In the race of viruses such as HBV, HCV, HIV and Hantavirus culminating to such irregularities, corona virus is the latest culprit.^{14, 15, 16}

Our research gives a proof that the change in menstrual cycle after COVID-19 infection is a fact and the most prevalent among these changes are increased cycle length and a decreased bleeding volume. Similar changes were reported in a retrospective study among females from Tongji Hospital, Wuhan, China.⁵ These changes can lead to a decline in fertility rate and an overall subjective wellbeing of populace in the long run, hence necessitating respective targeted aspects where adjustments are needed to evade this problem.^{17, 18}

Another study in India conducted a somewhat related research and found out that 78% women reported menstrual cycle changes during COVID-19 infection and 64% women declared having irregular menstrual cycle even after coronavirus infection. This study advocates our own study by proving that the menstrual cycle

changes do occur after COVID-19 infection. This study does not report individual changes like menstrual volume changes, or whether the cycle length increased or decreased so we could not compare the frequencies of individual changes.¹⁹

We took the quest a step further and the principal outcomes of this cross-sectional study indicate that COVID-19 associated menstrual cycle changes are highly influenced by the age (p<0.05), profession (p<0.05), marital status (p<0.001) and parity of females (p<0.001). It is established that as the age of the participant and her parity increases, the incidence of irregularities is also increased. Alongside the most afflicted groups are married females, specifically housewives.

We were hesitant to speculate an absolute reason, since there is plenty of room for correlation over causation. If we consider all these changes such as length of cycle, volume of bleeding and pain as a unified variable, these can be attributed to many reasons. First of all, the oscillating levels of estrogen and progesterone, in such wise as preceding to menopause, disrupt the protective role offered by estrogen owing to an activation of antibody response.^{20, 21} Secondly any alteration in the neurotransmitter system activity or response, as is validated by changes in the premenstrual symptoms and the inflicted stress of contracting the disease itself, is proven to disarray the hypothalamic-pituitary-ovarian axis-mediated endocrinal function of ovaries.^{22,23,24}

Another study from University of Sindh, Jamshoro showed that the COVID-19 indeed had a bearing on the mental health of females which indirectly affected their menstrual cycles. The study reported that COVID-19 affected mental health of 59.75% and menstrual health of 25.75% of the participants with variable response to changes in menstrual cycle length and menstrual flow.²⁵ Several studies conducted during the COVID-19 outbreak have consistently indicated that females, particularly girls and women, appear to be highly

susceptible to experiencing adverse psychological effects associated with stress.²⁶ The substantial strain that the women are facing during the COVID-19 pandemic can affect their menstrual cycle which can be exacerbated in South-Asian countries like Pakistan by cultural taboos and poor education related to menstruation, unavailability of menstrual hygiene products and poor hygiene facilities.²⁷ Though there can be many other possible reasons to why the menstrual cycle is being affected, but it is clear that COVID-19 is taking a plunge on the menstrual health of females which could have negative consequences in the long run.

Another reason for the observed changes could be the use of dexamethasone. As we know that this drug is important in COVID-19 infected patients, Dexamethasone might be a risk factor for menstrual changes in COVID-19 patients, affecting menstrual cycle patterns and blood loss.²⁸

The present study exhibits certain limitations that should be taken into account while interpreting the findings. Primarily, due to the utilization of cross-sectional data, the participants were not followed longitudinally to observe any subsequent changes or improvements over time. Secondly, some data on the participants' characteristics were collected through self-reporting by participants. Even though the questionnaire was elaborated and bilingual, there is always room for a certain yet unfound bias. Thirdly, we could not add any clinical laboratory result data to further establish our claims due to constrained resources. Nevertheless, this research opens room for further study with respect to finding a concrete root cause and added significance of each variable.

Conclusion

This research paper explores the impact of COVID-19 on the menstrual health of females of childbearing age in Rawalpindi, Pakistan. The study establishes the existence of menstrual cycle changes following COVID-19 infection and identifies a significant association between these changes and various demographic factors. The findings are applicable to females worldwide, making a valuable contribution to scientific knowledge.

Given the observed link between COVID-19 contraction and menstrual irregularities, it is crucial to prioritize preventive, therapeutic, and safety measures. Hormonal profiling and fertility tests should be emphasized for the sake of public reproductive health and patient care.

Further research is necessary to investigate the underlying causes of these changes and to utilize the research data for enhancing menstrual and sexual health on a global scale.

Acknowledgments: We are thankful to our professors and colleagues who guided us throughout our research project. We would also like to give thanks to the volunteers who willingly took part in our research.

References

1. Coronavirus disease (covid-19) - events as they happen [Internet]. World Health Organization. World Health Organization; [cited 2021Aug30]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>
2. Coronavirus cases: [Internet]. Worldometer. [cited 2021Aug30]. Available from: <https://www.worldometers.info/coronavirus/>
3. Cohut M. How does Long COVID affect Periods? [Internet]. Medical News Today. MediLexicon International; 2021 [cited 2021Aug30]. Available from: <https://www.medicalnewstoday.com/articles/long-covid-and-periods-the-unspoken-impact-on-female-well-being>
4. Zafar M, Sadeeqa S, Latif S, Afzal H. Pattern and prevalence of menstrual disorders in adolescents. *International Journal of Pharmaceutical Sciences and Research*. 2017;2088-99.
5. Li K, Chen G, Hou H, Liao Q, Chen J, Bai H, Lee S, et al. Analysis of sex hormones and menstruation in COVID-19 women of child-bearing age. *Reproductive biomedicine online*. 2021 Jan 1;42(1):260-7.
6. Puthusserry ST, Delariarte CF. The Prevalence of Premenstrual Syndrome and Premenstrual Dysphoric Disorder during Covid19 Pandemic on Late Adolescents. *North American Journal of Psychology*. 2022 Mar 1;24(1):171-182.
7. Phelan N, Behan LA, Owens L. The impact of the COVID-19 pandemic on women's reproductive health. *Frontiers in endocrinology*. 2021;12.
8. Okechukwu EC, Tibaldi L, La Torre G. The impact of COVID-19 pandemic on mental health of Nurses. *La Clinica Terapeutica*. 2020 Sep 9;171(5): e399-400.
9. Giorgi G, Lecca LI, Alessio F, Finstad GL, Bondanini G, Lulli LG, Arcangeli G, et al. COVID-19-related mental health effects in the workplace: a narrative review. *International journal of environmental research and public health*. 2020 Nov;17(21):7857.
10. Kotlar B, Gerson E, Petrillo S, Langer A, Tiemeier H. The impact of the COVID-19 pandemic on maternal and perinatal health: a scoping review. *Reproductive health*. 2021 Dec;18:1-39.
11. Giménez-Espert MD, Prado-Gascó V, Soto-Rubio A. Psychosocial risks, work engagement, and job satisfaction of nurses during COVID-19 pandemic. *Frontiers in Public Health*. 2020 Nov 20;8:566896.
12. Rostami Dovom M, Ramezani Tehrani F, Djalalinia S, Cheraghi L, Behboudi Gandavani S, Azizi F. Menstrual cycle irregularity and metabolic disorders: a population-based prospective study. *PLoS One*. 2016 Dec 16;11(12):e0168402.

13. Ali SA, Baloch M, Riaz L, Iqbal A, Riaz R, Perveen B, Siddiqui M, et al. Perceptions, Practices, and Challenges Regarding Menstrual Hygiene Among Women in Karachi, Pakistan: A Comparison Between General Population and Healthcare Workers. *Cureus*. 2020 Aug;12(8): e9894
14. Kurmanova AM, Kurmanova GM, Lokshin VN. Reproductive dysfunctions in viral hepatitis. *Gynecological Endocrinology*. 2016 Sep 30;32(sup2):37-40.
15. Schoenbaum EE, Hartel D, Lo Y, Howard AA, Floris-Moore M, Arnsten JH, Santoro N. HIV infection, drug use, and onset of natural menopause. *Clinical Infectious Diseases*. 2005 Nov 15;41(10):1517-24.
16. Kallio ER, Helle H, Koskela E, Mappes T, Vapalahti O. Age-related effects of chronic hantavirus infection on female host fecundity. *Journal of Animal Ecology*. 2015 Sep;84(5):1264-72.
17. Margolis R, Myrskylä M. A global perspective on happiness and fertility. *Population and development review*. 2011 Mar;37(1):29-56.
18. Contandriopoulos D, Benoît F, Bryant-Lukosius D, Carrier A, Carter N, Deber R, Duhoux A, et al. Structural analysis of health-relevant policy-making information exchange networks in Canada. *Implementation Science*. 2017 Dec;12(1):1-1.
19. Puthusserry ST, Delariarte CF. The Prevalence of Premenstrual Syndrome and Premenstrual Dysphoric Disorder during Covid19 Pandemic on Late Adolescents. *North American Journal of Psychology*. 2022 Mar 1;24(1).
20. van den Beld AW, Kaufman JM, Zillikens MC, Lamberts SW, Egan JM, van der Lely AJ. The physiology of endocrine systems with ageing. *The Lancet Diabetes & Endocrinology*. 2018 Aug 1;6(8):647-58.
21. Grandi G, Facchinetti F, Bitzer J. The gendered impact of coronavirus disease (COVID-19): do estrogens play a role?. *The European Journal of Contraception & Reproductive Health Care*. 2020 May 3;25(3):233-4.
22. Steiner M, Dunn E, Born L. Hormones and mood: from menarche to menopause and beyond. *Journal of affective disorders*. 2003 Mar 1;74(1):67-83.
23. Moayed MS, Vahedian-Azimi A, Mirmomeni G, Rahimi-Bashar F, Goharimoghadam K, Pourhoseingholi MA, Abbasi-Farajzadeh M, et al. Depression, Anxiety, and Stress Among Patients with COVID-19: A Cross-Sectional Study. *Clinical, Biological and Molecular Aspects of COVID-19*. 2021;1321:229.
24. Ozimek N, Velez K, Anvari H, Butler L, Goldman KN, Woitowich NC. Impact of Stress on Menstrual Cyclicity During the Covid-19 Pandemic: A Survey Study. *Journal of Women's Health*. 2021 Sep 28.
25. Samo AA, Baig NM, Sayed RB, Sohail A, Usman F, Abbas SJ, Khan T, Laghari ZA. Association of COVID19-affected Mental Health with Menstrual Abnormalities among University Students: A cross sectional study from Pakistan. *BioSight*. 2021 Dec 31;2(2):40-9.
26. Pedrosa AL, Bitencourt L, Frões AC, Cazumbá ML, Campos RG, de Brito SB, Simões e Silva AC. Emotional, behavioral, and psychological impact of the COVID-19 pandemic. *Frontiers in psychology*. 2020 Oct 2;11:566212.
27. Hashmi N, Ullah I, Tariq SR, De Filippis R, Orsolini L, Da Costa MP, et al. How is the COVID-19 pandemic affecting women's menstrual cycles and quality of life? A view from South Asia. *BJPsych Advances*. 2022 Jul;28(4):274-7.
28. Warner P., Whitaker L., Parker R., Weir C., Douglas A., Hansen C., Madhra M., Hillier S., Saunders P., Iredale J., et al. Low dose dexamethasone as treatment for women with heavy menstrual bleeding: A response-adaptive randomised placebo-controlled dose-finding parallel group trial (DexFEM) *EBioMedicine*. 2021;69:103434. doi: 10.1016/j.ebiom.2021.103434