

# Effect of COVID-19 on Menstruation: An Observational Study

Muskan Singh<sup>1</sup>, Manjinder Kaur<sup>2</sup>, Anjana Verma<sup>3\*</sup>, Nalini Sharma<sup>4</sup>

<sup>1</sup>Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

<sup>2</sup>Department of Physiology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

<sup>3</sup>Department of Community Medicine, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

<sup>4</sup>Department of Obstetrics & Gynaecology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

## Abstract

**Introduction:** COVID-19 patients have been reported to have systemic complications. Analyzing its effect on the endocrine system is essential to ensure women's reproductive health.

**Aim:** This study aimed to determine the effect of COVID-19 disease on menstruation.

**Methods:** It was a hospital-based cross-sectional study conducted from October 2021 to April 2022, using a validated questionnaire to collect the data. The study included females (15 to 49 years) who had confirmed COVID infection.

**Results:** A total of 132 females participated in the study. For 29 (22%) patients presenting with menstrual cycle changes, most common change was prolonged cycle (14%). An increase in menstrual volume was reported by 12%, where as 35% of patients experienced more pain during menstruation. Menstrual irregularities were significantly higher in severe infection (*p-value* 0.04).

**Conclusion:** There were transient changes in menstruation in COVID-19-infected patients, with a higher probability of menstruation abnormalities among severely infected patients.

**Keywords:** Humans, Female, Menstruation, Cross-Sectional Studies, COVID-19, Menstruation Disturbances, Menstrual Cycle, Surveys and Questionnaires, Probability.

## INTRODUCTION

As COVID-19 continues to infect people and cause mortality worldwide, it is critical to comprehend the ramifications of the pandemic on women's reproductive health. COVID-19 disease is caused by a type of severe acute respiratory syndrome coronavirus (SARS-CoV-2) and uses the angiotensin-converting enzyme 2 (ACE2) receptor for viral entry in the renin-angiotensin system (RAS). The human reproductive system has ACE 2 receptors and is presumed that SARS-CoV-2 can affect the female reproductive system too.<sup>[1]</sup> COVID-19 disease is a severe acute respiratory disease, but reports of multiorgan involvement are being published.<sup>[2]</sup> Therefore, it is important to study the effects of COVID-19 on the female reproductive system as well, which can help mitigate sexual and reproductive health-related morbidity and mortality. Moreover, the effects of lockdowns (as a response to the pandemic) also significantly impacted the overall health and economic stability of women worldwide.

There are many studies published about the disruptions caused to sexual and reproductive health care due to the COVID-19 pandemic.<sup>[3]</sup> In the last two years since the start of the COVID-19 pandemic, innumerable studies have been published, uncovering newer research questions. Experts believe that it is critical to study the complex interplay between various risk factors: biological and behavioral, to monitor and remit the inequity in health, gender and social effects of this disease. Studying one particular aspect of the effects of COVID-19 is difficult because of various confounding factors involved. There is a paucity of studies done to evaluate the effect of COVID-19 on the female reproductive endocrine

**Address for correspondence:** Anjana Verma,

Department of Community Medicine, Geetanjali Medical College and Hospital,  
Udaipur, Rajasthan, India

E-mail: anjanaverma504@gmail.com

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system in the Indian population. Hence, this study was conducted to study the effects of COVID-19 on menstruation of reproductive age group females.

## METHODS

It was a hospital-based cross-sectional study conducted in the field practice area of a tertiary care centre in Udaipur, Rajasthan. The female patients of the reproductive age group (15 to 49 years age), diagnosed with COVID-19 reverse transcription polymerase chain reaction (RT-PCR) were included in the study.

Keeping the power of study at 80% and a significance level 0.05, taking the prevalence of menstrual cycle changes (prolonged cycle) as 19% among COVID-19 infected patients, from a study done by Li K, in Tongzi, China and taking absolute error of 7% (taking into account the results of a pilot study conducted with 10 patients from a different hospital) sample size for the study was determined using the standard formula:  $n = (Z_{\alpha/2})^2 (p q) / d^2$ .<sup>[4]</sup> After adding the 10% nonresponse rate, the final sample size was 132. The medical records of the patients diagnosed with COVID-19 were accessed at a tertiary care center, and a list of the female patients of the reproductive age group (15 to 49 years) was created and patients were selected using a random sampling technique. Selected patients were contacted and asked if they had regular menstrual cycles in the 6 months before being infected with COVID-19. Those who were willing to participate in the study, were included in the study. The information about menstrual cycles was collected by phone for another 2 months after discharge from the hospital. A

detailed history of the patient was taken using a pre-designed, pre-tested, validated questionnaire after taking informed consent from the study participants. The questionnaire was prepared with the help of experts from the Obstetrics & Gynaecology department and was validated. Cronbach alpha for the questionnaire was 0.81. The questionnaire included the demographic profile (occupation, area of residence etc.), menstrual history and obstetric history. Clinical history about the COVID illness, like duration of illness and severity, was also taken. Patients were defined as mild or severe as follows: (i) mild: patients with uncomplicated upper respiratory tract infection may have mild symptoms such as fever, cough, sore throat, nasal congestion, malaise, headache; without shortness of breath or hypoxia (normal saturation). (ii) severe: acute respiratory distress syndrome, adults with clinical signs of pneumonia and admitted in the hospital for management.<sup>[5]</sup> The change in the menstrual cycle (prolonged or shortened) was defined as a prolongation or shortening of more than 7 days compared with the average of the last 6-month cycles of the same patient before having COVID disease. The change in menstrual volume was classified into either “increased volume” or “decreased volume” after comparing with the previous menstrual volume of the same patient (before COVID).<sup>[4]</sup>

Prior approval from Institutional Ethics Committee (IEC) was obtained before commencing the study. Ref GU/HREC/2021/1997B dated 27-07-2021. Informed and written consent was taken from every participant before being included in the study.

**Table 1:** Clinical, demographic characteristics and menstrual abnormalities of the study participants (n = 132)

Demographic variables		No. (%)	Clinical characteristics		No. (%)
Marital status	Married	85 (64.4)	Approximate duration of illness	< 1 week	18 (13.6)
	Unmarried	47 (35.6)		1–2 weeks	80 (60.6)
Residence	Urban	93 (70.5)	Comorbidities	>2 weeks	34 (25.8)
	Rural	39 (29.5)		None	75 (56.8)
Occupational status	Employed	82 (62)	Hypertension	27 (20.5)	
	Student	41 (31)	Diabetes	22 (16.7)	
	Housewife	9 (7)	Others	8 (6)	
Parity	0	56 (42.4)	Severity of COVID	Mild	102 (77)
	1-2	74 (56.1)		Severe	30 (23)
	>=3	2 (1.5)			
Menstrual changes		No. (%)	Menstrual changes		No. (%)
Menstrual cycle changes	Unchanged	103 (78)	Pain during menses	Unchanged	86 (65)
	Prolonged cycle	18 (14)		Increased	46 (35)
	Shortened cycle	11 (8)		Decreased	0 (0)
Menstrual volume	Unchanged	102 (77)	Premenstrual symptoms	Unchanged	107 (81)
	Increased	16 (12)		Increased	25 (19)
	Decreased	14 (11)		Decreased	0 (0)

**Table 2:** Multiple logistic regression for the association of variables with menstrual abnormalities among COVID-19 patients

Variable		Menstrual cycle changes Adjusted OR (95% CI)	<i>p</i> -value	Menstrual volume changes Adjusted OR (95% CI)	<i>p</i> -value
Age		1.08 (0.27–11.2)	1.23	1.13 (0.34–10.9)	1.17
Marital status	Married	1.01 (0.73–4.5)	0.99	1.06 (0.69–6.2)	1.04
Residence	Urban	1.32 (0.53–3.78)	0.51	1.28 (0.6–4.82)	0.55
Occupational status	Employed	1.31 (0.39–3.6)	0.49	1.29 (0.49–5.8)	0.56
Severity of disease	Severe	1.28 (1.1–3.7)	0.04*	1.32 (1.2–2.9)	0.03*
Comorbidities	HTN	0.77 (0.57–2.63)	0.58	0.54 (0.21–8.6)	1.32
	DM	0.66 (0.38–3.2)	0.72	0.69 (0.26–7.31)	1.17
	Others	0.52 (0.41–4.8)	0.98	0.83 (0.51–5.2)	0.81
Duration of illness		1.42 (0.94–3.57)	0.08	1.34 (0.84–2.09)	0.09

\*Statistically significant (*p*-value <0.05)

## RESULTS

Mean age of the participants was 29 ( $\pm$  8.1) years. The majority (64.4%) of the participants were married and lived in urban area (70.5%). About 57% were multiparous females and 60% were using some method of contraception. Table 1 shows the study participants' demographic, clinical characteristics and menstrual abnormalities. Of the subjects, 102 (77%) had a history of mild illness, while rest (23%) had severe COVID. About 22% (29) of the patients revealed that their menstrual cycles were changed following COVID illness (14% had prolonged cycle; 8% had shortened cycle). Almost same number of patients (23%) also noticed menstrual volume changes. In the follow-up period, the majority (89% of the patients with menstrual cycle changes and 91% of the patient with menstrual volume changes) returned to normal within 1 to 2 months.

After applying the multiple logistic regression, the menstrual cycle and menstrual volume changes were found to be significantly associated with the severity of the disease, with an adjusted odds ratio (AOR) of 1.28 (CI 1.1-3.7) and 1.32 (CI 1.2 -2.9), respectively. The other variables such as age, marital status, residence, occupational status or comorbidities were insignificant (Table 2).

## DISCUSSION

Viral infections such as human immunodeficiency virus (HIV), hepatitis B, hepatitis C etc. can affect the female reproductive endocrine system. The effects of viral infections range from changes in menstruation to infertility and pregnancy loss.<sup>[6]</sup> Few studies have evaluated the effect of COVID-19 on menstruation. Our study found that about 22% (29) of the patients experienced a change in their menstrual cycle: (14% had prolonged cycle; 8% had shortened cycle). Almost same number of patients (23%) also noticed menstrual volume changes. This finding is comparable to the results shown by Li K *et al.* in a study done in China, which revealed that about 28% (50) patients had menstrual cycle changes (19% had prolonged cycle) and 25% (45) of patients presented with menstrual volume changes.<sup>[4]</sup> Another study done in Turkey by Yuksel B *et al.* reported that about 27.6%

of females experienced menstrual abnormalities during the COVID-19 pandemic (*p*-value = 0.008).<sup>[7]</sup> Menstrual cycle changes post-COVID-19 have also been reported by Phelan N *et al.*, which showed that about 46% (441) of women experienced an overall change in their menstrual cycle during the COVID-19 pandemic.<sup>[8]</sup> In our study, we also assessed the painful periods and premenstrual symptoms among the study participants. The results showed that about 35% (46) patients experienced increased pain during menses and 19% (25) had worse premenstrual symptoms (PMS) after COVID disease. These results are comparable to the study done by Phelan N *et al.*, which revealed that 30% (173) patients experienced new painful periods after COVID-19 illness. About 53% (483) reported a worsening in premenstrual symptoms (PMS), whereas 7% (60) felt that their PMS had improved following the COVID-19 illness.<sup>[8]</sup> There are lacunae in the information regarding the relationship between pandemic or infectious outbreaks and menstrual abnormalities. However, literature shows that disasters (local or global) have a negative effect on normal menstrual cycles. Liu X *et al.* studied the association of menstrual abnormalities and mental health among female middle school post-earthquake in Wenchuan, China. It revealed that about 76.6% experienced menstrual abnormalities.<sup>[9]</sup> The menstrual abnormalities following COVID-19 reported in our study can be attributed to psychological stress. Stress causes inhibition of the hypothalamic-pituitary-gonadal axis and has an inhibitory effect on the release of gonadotrophin-releasing hormone (GnRH) from the hypothalamus and glucocorticoids cause inhibition of luteinizing hormone release and production of estrogen and progesterone from the ovaries. Moreover, the ovaries regulate the menstruation cycle and is also affected by external factors such as infections or drugs.<sup>[10]</sup>

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## CONFLICTS OF INTEREST

Nil

## REFERENCES

1. Fu J, Zhou B, Zhang L, Balaji KS, Wei C, Liu X, Chen H, Peng J, Fu J. Expressions and significances of the angiotensin-converting enzyme 2 gene, the receptor of SARS-CoV-2 for COVID-19. *Molecular biology reports*. 2020 Jun;47:4383-92.
2. Thakur V, Ratho RK, Kumar P, Bhatia SK, Bora I, Mohi GK, Saxena SK, Devi M, Yadav D, Mehariya S. Multi-organ involvement in COVID-19: beyond pulmonary manifestations. *Journal of clinical medicine*. 2021 Jan 24;10(3):446.
3. Tang K, Gaoshan J, Ahonsi B, Ali M, Bonet M, Broutet N, Kara E, Kim C, Thorson A, Thwin SS. Sexual and reproductive health (SRH): a key issue in the emergency response to the coronavirus disease (COVID-19) outbreak. *Reproductive Health*. 2020 Dec;17(1):1-3.
4. Li K, Chen G, Hou H, Liao Q, Chen J, Bai H, Lee S, Wang C, Li H, Cheng L, Ai J. Analysis of sex hormones and menstruation in COVID-19 women of child-bearing age. *Reproductive biomedicine online*. 2021 Jan 1;42(1):260-7.
5. World Health Organization 2. Clinical management of COVID-19: interim guidance, 27 May 2020. World Health Organization; 2020.
6. Kurmanova AM, Kurmanova GM, Lokshin VN. Reproductive dysfunctions in viral hepatitis. *Gynecological Endocrinology*. 2016 Sep 30;32(sup2):37-40.
7. Yuksel B, Ozgor F. Effect of the COVID-19 pandemic on female sexual behavior. *International Journal of Gynecology & Obstetrics*. 2020 Jul;150(1):98-102.
8. Phelan N, Behan LA, Owens L. The impact of the COVID-19 pandemic on women's reproductive health. *Frontiers in endocrinology*. 2021 Mar 22;12:642755.
9. Liu X, Yang Y, Yuan P, Zhang X, Han Y, Cao Y, Xiong G. A study of the relationship between mental health and menstrual abnormalities in female middle school students from post-earthquake Wenchuan. *Bioscience trends*. 2010 Feb 1;4(1).
10. Chrousos GP, Torpy DJ, Gold PW. Interactions between the hypothalamic-pituitary-adrenal axis and the female reproductive system: clinical implications. *Annals of internal medicine*. 1998 Aug 1;129(3):229-40.