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ORIGINAL ARTICLE

Effect of COVID-19 Vaccine on Menstrual Cycles

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Abstract

Background: A worldwide increase in menstrual abnormalities was reported post Coronavirus disease (COVID-19) vaccinations. The study aimed to investigate the prevalence and impact of the menstrual abnormalities post COVID-19 vaccinations in Bahrain. The study also looked at the variations after first, second and third dose of vaccination.

Methods: The survey was sent to the participants who had received the COVID-19 vaccinations (n=1000) via social media as well as printed copies; 343 responses were received. Participants who had a history of irregular menstruation prior to COVID-19, were on hormonal or non-hormonal medications, gynaecological and non-gynaecological diseases were excluded from the study.

Results: The findings indicated that 62.5% of the participants reported menstrual abnormalities after COVID-19 vaccinations manifested as changes in frequency, length and quantity of menstruation. Majority of the participants had Sinopharm for their first and second doses (62.8% and 58.5% respectively) while majority of the participants had Pfizer as third or booster dose (88.4%); however, was no significant effect of the type of vaccine on the menstrual changes. 46.8% of the participants reported that their daily life activities were affected and about 5.8 % participants were prescribed medications to regulate their menstruation.

Conclusion: The study indicated that there is a temporary effect of COVID-19 vaccination on menstrual cycle about which the women needs to be counselled and informed.

Keywords: COVID-19 vaccination, menstrual abnormality, variation in menstruation

Introduction

Coronavirus emerged as a global pandemic due to its accelerated geographic spread over the last two years.[1] The pandemic posed a devastating effect on public health and the global economy. Preventive strategies form the central role in reducing the public spread of the virus along with successful disease isolation and community containment. Mass vaccination drives were held worldwide to develop herd immunity and were the only effective tool

to combat the situation.[2] Currently, there are both mRNA and vector vaccines available for COVID-19. BNT162b2 (Pfizer-BioNTech), ChAdOx1 (Oxford-AstraZeneca), Sinopharm and Sputnik vaccines were approved for use in Bahrain and in many parts of the world.[3] COVID-19 vaccinations have been effective in reducing hospitalizations and mortalities; however, many research studies have reported side effects, ranging from mild symptoms like fatigue, headache, cramps in the arms to severe symptoms like hemorrhage, thrombosis, anaphylaxis, venous blood clots and neurological events including stroke and myocardial infarction as recorded in the Vaccine Adverse Event Reporting System.[4-8]

Vaccination against SARS-CoV-2 was recommended for all women, including those who are pregnant or planning to become pregnant. Since the beginning of the pandemic, there have been increasing discussions on social media, during clinic visits or telemedicine indicating that women have experienced menstrual changes related to both infection and vaccination, including altered duration, frequency, regularity, pain, volume, and worsened premenstrual syndrome (PMS), which has fuelled vaccine hesitancy or refusal.[9-11] Several reports on short-term and transient menstrual disturbances post COVID-19 vaccinations surfaced and about 51,211 suspected side effects of menstrual disorders (heavier bleeding, delayed periods, and unexpected vaginal bleeding) were reported in the Medicines and Healthcare Products Regulatory Agency (MHRA) in the United Kingdom as updated on 18 May 2022.[12]

Studying menstrual cycle features is challenging as normal variation exists within women over the lifespan and in relation to characteristics such as age, parity, history of infertility, body mass index (BMI) and exercise.[13,14] However, an increase in visits to Obstetrics and Gynecology (OBGYN) clinics was reported post-COVID-19 vaccinations globally. Edelman et al., in their cohort study, reported that COVID-19 vaccination is associated with a less than 1-day change in cycle length for both vaccine-dose cycles compared with pre-vaccine cycles.[9] In a cross-sectional survey conducted in Italy using a validated MECOVAC survey, it was reported that there were slight changes seen in menstruation cycles after the second dose of vaccination.[15] A similar cross-sectional study in the Middle East and North Africa (MENA) indicated that women experienced a longer duration of menstruation and cycle length after vaccination. The study also indicated that this menstrual abnormality had a negative impact on their quality of life.[16]

There is a lack of information on incidences of menstrual irregularities due to vaccination and its impact in the middle east and in Bahrain; hence this study aims to investigate the incidences of menstrual irregularities in the region and to assess the impact of the abnormalities on their lives. The study will also assess if there is any correlation between the type of vaccine administered and the menstrual abnormalities. This will help us to determine if the rates and severity are similar to as reported in the literature and help in making subsequent decisions for an optimal way of management.

Materials & Methods

A descriptive cross-sectional design was adopted for this study. A questionnaire adapted from the MECOVAC survey was modified to add some regional parameters for the study.[15] The questionnaire included two sections: the first section recorded the demographic and clinical characteristics, hormonal treatments, number of previous pregnancies and abortions, reproductive or (peri) menopausal status, and type of COVID-19 vaccine used for the first, second, and third doses. The second section assessed the frequency, length, and quantity of the menstrual cycles after the administration of the first dose, second and third dose of the COVID-19 vaccine, how long the abnormalities lasted, whether the participants required consultation and whether the abnormality affected their normal life or not.

Ethical approval was obtained from Salmanya Medical Complex Ethics committee. The study was conducted in the hospital setting, and the survey was sent to all women of reproductive age, including physicians. The survey was circulated between mid of March to April 2022 both as paper copies and electronically, whichever was convenient for the participants. The participants were informed and consented that their responses were anonymous

and that they could withdraw at any point if they decided to.

All women of reproductive age have received their first and second doses of COVID-19 vaccination and were included in the study. Women with gynecological diseases, undergoing hormonal and non-hormonal treatments that can affect menstrual cycle, in the menopause stage, and with a history of irregular menstrual cycle in the last twelve months before vaccine administration were excluded from the study.

The collected data were analysed by the Social Sciences (SPSS) program version 25. Descriptive analyses were used to describe the frequency and percentages for categorical variables and the mean (standard deviation) for continuous variables. Chi-square tests were used to assess the significant difference across the categorical variables. All the tests were two-tailed and a p-value < 0.05 was considered statistically significant.

Results

The survey was sent to 1000 participants, which included physicians and patients visiting the clinics. Sample size calculation revealed that a sample of 243 was required to get statistically significant results at 95% confidence and 5% margin of error. A total of 343 responses were received, demonstrating a response rate of 34.3%. Forty-two women were removed from the analysis, 23 of them being in perimenopause or menopause, 12 had PCOS, and 7 had irregular cycles prior to receiving the vaccination. No participants were undergoing hormonal and non-hormonal treatments. Hence responses of 301 participants were used for analysis.

Table 1: Demographics

Participant demographics	n (%)
Age	
20-30	97 (32.2%)
30-40	118 (29.2%)
40-50	86 (28.6%)
Marital Status	
Single	84 (27.9%)
Married	216 (71.8%)
Number of live births	
0	49 (16.3%)
1-2	84 (27.9%)
≥3	103 (34.2%)
Nationality	
Bahraini	249 (82.7%)
Non-Bahraini	43 (14.3%)
COVID- 19 infection	
Yes	188 (62.5%)
No	113 (37.5%)

The participant's ages ranged from 20 to 50 years, with 32.2 % of age group 20-30, 29.2 % of age group 30-40, and 28.6% of age group 40-50. The majority of the participants were married (71.8%) and were Bahraini (82.7%). 188 (62.5%) of the participants had been infected with COVID-19 in the recent past (Table 1). The majority of the participants had Sinopharm for their first and second doses, while a majority of the participants had Pfizer as third or booster dose (Table 2).

Table 2: Frequency distribution of intake of COVID-19 vaccines for first, second and third doses

Type of Vaccine	First Dose	Second Dose	Third Dose
Covishield	3 (1.0%)	1 (0.3%)	-
Pfizer	76 (25.2%)	84 (27.9%)	236 (78.4%)
Sinopharm	189 (62.8%)	176 (58.5%)	16 (5.3%)
Sputnik	33 (11.0%)	30 (10.0%)	7 (2.3%)
Others	-	8 (2.7%)	6 (2.0%)

One hundred and thirteen (37.5%) reported no changes in menstruation length, frequency, or quantity of menstruation post-COVID-19 vaccinations. Among 188 who were infected prior to COVID-19, 76 reported no change in length, frequency, or quantity of menstruation, and among the 113 participants who were not infected with COVID-19, only 37 reported no menstrual abnormalities ($p= 0.219$). This indicated that there was no significant association of menstrual abnormalities with the history of COVID-19 infection.

Variation in frequency of menstruation

Almost 75.0% (141 out of 188) of the participants who experienced menstrual abnormalities reported having variations in the frequency of menstruation post-COVID-19 vaccination. The majority of the participants had their menstruation arrived 1-5 days earlier than expected after the third dose of vaccination.

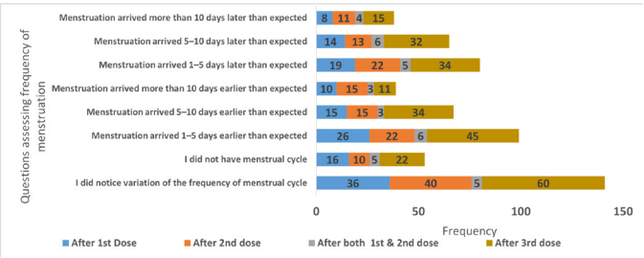

Figure 1: Frequency distribution of participants with variations in frequency of menstruation

Variation in length of menstruation

About 60.6% (114 out of 188) reported variations in length, and majority were after the third dose of vaccination. Overall, an increase in length, where 77 (40.9%) reported to have menstruation lasted for more than 7 days, was seen after COVID-19 vaccinations. Spotting was even reported in 75 (39.8%) of the participants; notably higher incidences were seen after the third dose.

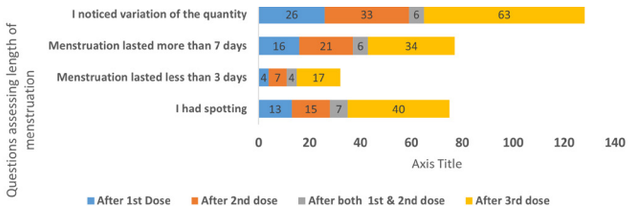

Figure 2: Frequency distribution of participants with variations in length of menstruation

Variation in quantity of menstruation

Variation in quantity was noticed in 128 (68.1%) of the participants, with about more than half of the incidences after the third dose of vaccination. Most of the participants reported having heavier menstruation than usual post-COVID-19 vaccination.

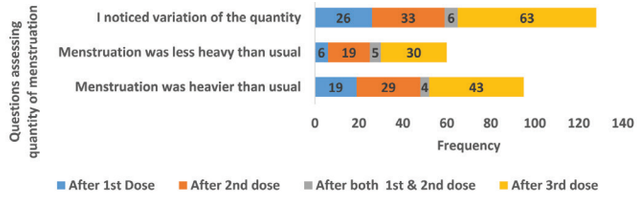

Figure 3: Frequency distribution of participants with variations in quantity of menstruation

There was no significant effect of the type of vaccine on the menstrual changes (Pfizer vs Sinopharm, p= 0.12); however, more incidences of variations in the frequency were noted after the third dose of vaccination, where notably, 78.4% of participants were vaccinated with Pfizer. The variations in menstruation during the first, second, and third doses of vaccination are shown in table 3.

Table 3: Frequency distribution of variations in menstruation after first, second and third doses of COVID-19 vaccines

After first dose Frequency	Covishield n(%)	Pfizer n(%)	Sinopharm n(%)	Sputnik n(%)	Total
I did notice variation of the frequency of menstrual cycle	0 (0.0%)	13 (36.1%)	18 (50.0%)	5 (13.9%)	36
I did not have menstrual cycle	0 (0.0%)	5 (31.3%)	10 (62.5%)	0 (0.0%)	16
Menstruation arrived 1–5 days earlier than expected	0 (0.0%)	6 (23.1%)	16 (61.5%)	4 (15.4%)	26
Menstruation arrived 5–10 days earlier than expected	0 (0.0%)	7 (46.7%)	8 (53.3%)	0 (0.0%)	15
Menstruation arrived more than 10 days earlier than expected	0 (0.0%)	3 (30.0%)	7 (70.0%)	0 (0.0%)	10
Menstruation arrived 1–5 days later than expected	0 (0.0%)	6 (31.6%)	9 (47.4%)	4 (21.1%)	19
Menstruation arrived 5–10 days later than expected	0 (0.0%)	3 (21.4%)	8 (57.1%)	3 (21.4%)	14
Menstruation arrived more than 10 days later than expected	0 (0.0%)	4 (50.0%)	4 (50.0%)	0 (0.0%)	8

Length					
I noticed variation of the length of menstrual cycle	0 (0.0%)	12 (41.4%)	14 (48.3%)	3 (10.3%)	29
I had spotting	0 (0.0%)	5 (38.5%)	8 (61.5%)	1 (7.7%)	13
Menstruation lasted more than 7 days	0 (0.0%)	8(50.0%)	7 (43.8%)	3 (6.3%)	16
Menstruation lasted less than 3 days	0 (0.0%)	1 (25.0%)	3 (75.0%)	0 (0.0%)	4
Quantity					
I noticed variation of the quantity	0 (0.0%)	10 (38.5%)	16 (61.5%)	0 (0.0%)	26
Menstruation was heavier than usual	0 (0.0%)	7 (36.8%)	12 (63.2%)	0 (0.0%)	19
Menstruation was less heavy than usual	0 (0.0%)	1 (16.7%)	5 (83.3%)	0 (0.0%)	6
After second dose Frequency	**Covishield n(%)**	**Pfizer n(%)**	**Sinopharm n(%)**	**Sputnik n(%)**	**Total**
I did notice variation of the frequency of menstrual cycle	0 (0.0%)	13 (32.5%)	22 (55.0%)	5 (12.5%)	40
I did not have menstrual cycle	0 (0.0%)	5 (31.3%)	3 (30.0%)	2 (20.0%)	10
Menstruation arrived 1–5 days earlier than expected	0 (0.0%)	5 (22.7%)	15 (68.2%)	2 (9.1%)	22
Menstruation arrived 5–10 days earlier than expected	0 (0.0%)	3 (20.0%)	6 (40.0%)	6 (40.0%)	15
Menstruation arrived more than 10 days earlier than expected	0 (0.0%)	3 (20.0%)	7 (46.7%)	5 (33.3%)	15
Menstruation arrived 1–5 days later than expected	0 (0.0%)	8 (36.4%)	12 (54.5%)	2 (9.1%)	22
Menstruation arrived 5–10 days later than expected	0 (0.0%)	4 (30.8%)	6 (46.2%)	3 (23.1%)	13
Menstruation arrived more than 10 days later than expected	0 (0.0%)	1 (9.1%)	5 (45.5%)	5 (45.5%)	11
Length					
I noticed variation of the length of menstrual cycle	0 (0.0%)	9 (37.5%)	10 (41.7%)	5 (20.8%)	24
I had spotting	0 (0.0%)	3 (20.0%)	10 (66.7%)	2 (13.3%)	15
Menstruation lasted more than 7 days	0 (0.0%)	5 (23.8%)	11 (52.4%)	5 (23.8%)	21
Menstruation lasted less than 3 days	0 (0.0%)	3 (42.9%)	4 (57.1%)	0 (0.0%)	7
Quantity					
I noticed variation of the quantity	0 (0.0%)	13 (39.4%)	13 (39.4%)	7 (21.2%)	33
Menstruation was heavier than usual	0 (0.0%)	9 (31.0%)	13 (44.8%)	7 (24.1%)	29
Menstruation was less heavy than usual	0 (0.0%)	9 (47.4%)	8 (42.1%)	2 (10.5%)	19
After third dose Frequency	**Covishield n(%)**	**Pfizer n(%)**	**Sinopharm n(%)**	**Sputnik n(%)**	**Total**
I did notice variation of the frequency of menstrual cycle	0 (0.0%)	53 (88.3%)	4 (6.7%)	3 (5.0%)	60
I did not have menstrual cycle	0 (0.0%)	20 (90.0%)	2 (4.5%)	0 (%)	22
Menstruation arrived 1–5 days earlier than expected	0 (0.0%)	44 (97.8%)	0 (0.0%)	1 (2.2)	45
Menstruation arrived 5–10 days earlier than expected	0 (0.0%)	33 (97.1%)	1 (2.9%)	0 (0.0%)	34
Menstruation arrived more than 10 days earlier than expected	0 (0.0%)	11 (100.0%)	0 (0.0%)	0 (0.0%)	11

Menstruation arrived 1–5 days later than expected	0 (0.0%)	31 (91.2%)	2 (5.9%)	1 (2.9%)	34
Menstruation arrived 5–10 days later than expected	0 (0.0%)	30 (93.8%)	1 (3.1%)	1 (3.1%)	32
Menstruation arrived more than 10 days later than expected	0 (0.0%)	14 (93.3%)	1 (6.7%)	0 (0.0%)	15
Length					
I noticed variation of the length of menstrual cycle	0 (0.0%)	52 (94.5%)	1 (1.8%)	2 (3.6%)	55
I had spotting	0 (0.0%)	37 (92.5%)	2 (5.0%)	1 (2.5%)	40
Menstruation lasted more than 7 days	0 (0.0%)	31 (91.2%)	3 (8.8%)	0 (0.0%)	34
Menstruation lasted less than 3 days	0 (0.0%)	14 (82.4%)	2 (11.8%)	1 (5.9%)	17
Quantity					
I noticed variation of the quantity	0 (0.0%)	57 (90.4%)	3 (4.7%)	2 (3.17%)	63
Menstruation was heavier than usual	0 (0.0%)	38 (88.4%)	4 (9.3%)	1 (2.3%)	43
Menstruation was less heavy than usual	0 (0.0%)	28 (98.3 %)	1 (3.3 %)	1 (3.3%)	30

About 46.8 % (88) of participants reported having their normal daily life activities affected by the menstrual irregularity post-COVID-19 vaccination. 60 out of 188 (31.9%) participants had to consult a doctor for their menstrual irregularities. About 5.8 % (n=11) of participants were prescribed medications to regulate their menstruation. Notably, the menstruation for the 11 cases went back to normal after either one or two cycles.

Discussion

The menstrual cycle is a vital reproductive sign and provides insight into hormonal imbalance as well as pregnancy. Menstrual disorders are extremely common and debilitating.[13,14] It can range from mild (not affecting life and daily activities) to severe, affecting her life, psychological status, productivity, and even sexual life. Short-term changes in the menstrual cycle have been reported both for mRNA and adenovirus vectored covid-19 vaccines.[17] Stress and anxiety were also reported in women with menstrual changes post COVID-19 infections.[18] Several studies were initiated worldwide to investigate the potential impact of COVID-19 vaccination on menstruation, including the longitudinal study by the NIH.[19]

Our study indicated that 62.5 % of the sample had menstrual abnormalities after COVID-19 vaccinations manifested as changes in frequency, length, and quantity of menstruation. The incidence rate of menstruation irregularity in this study is at par with the rates reported in similar studies. Lagana et al., 2022 in a nationwide study in Italy, reported that the majority of the women had their menstruation arrived 1-5 days earlier than the expected date after their vaccination. Our study indicated similar findings, with higher incidences of this change in frequency after the third dose of vaccine; however, there were no significant differences based on the type of vaccine administered during their first and second doses (Sinopharm) versus the third dose (Pfizer) (p= 0.152).[15]

Sinopharm was widely available and was accepted in the region, because of which we see the majority of women had this vaccine for their first and second doses. Pfizer was chosen for the third or booster dose in the region, reportedly based on its efficacy reports combating the coronavirus. [3] This marked shift in vaccine administration during their third dose can be noted in our study. A significant shift was seen in this study, where the incidences of women who reported heavy bleeding than usual were higher after the third dose (Pfizer) as compared to that after the first and second doses (p=0.019). Higher incidences of heavy bleeding were also reported in similar studies.[4] Alterations in the length of the menstrual cycle (more than seven days) were also in line with other studies.[15-17] Even though more incidences of change in length of menstruation were noted after the third dose of vaccination, the type of vaccine was not significantly related (p=0.069).

In our study, only 60 (31.9%) who had menstrual abnormalities had consulted a physician, and

68.08% did not seek any medical help. Our findings are in line with a similar cross-sectional study in the MENA region, where 65.4% reported not having resorted to medical help to alleviate their symptoms. One of the many reasons stated for lack of seeking help was hesitance to discuss menstruation irregularities in a conservative society such as the MENA region, which could also be extended in this study. Notably, only 11 of 60 who sought medical help required medications to alter their cycle, and fortunately, all the participants had their abnormalities resolved within one or two cycles. This finding is in line with other reports.[16, 20]

Conclusion

The preliminary findings indicated that women who received COVID-19 vaccinations had menstrual abnormalities at least for one or two of the following menstrual cycle. This change was seen regardless of the type of vaccine being used. It is recommended that women be informed prior to vaccination of short-term occurrence of menstrual abnormality and to seek proper medical advice in such conditions. Further studies are required to investigate the possible mechanisms behind these observations.

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