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MENSTRUAL IRREGULARITIES IN WOMEN AFTER COVID-19 INFECTION AND VACCINATION: A COMMUNITY BASED STUDY AMONG DUBAI HOSPITAL FEMALE STAFF AND WOMEN ATTENDING GYNECOLOGY CLINIC AND EMERGENCY

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Abstract

Background

Globally COVID-19 pandemic has significantly affected various domains of health, including women's menstrual health. Some studies reported that both COVID-19 infection and vaccination may cause menstrual irregularities and abnormal uterine bleeding (AUB). This study aimed to examine the relationship between COVID-19 infection, vaccination status, and menstrual changes in women working at Dubai Hospital and those attending the Gynecology Clinic and Emergency Department.

Objective: This study aimed to identify the association between COVID-19 infection, vaccination status, and menstrual changes in women at Dubai Hospital and the Gynecology Clinic and Emergency Department attendant.

Methods: This cross-sectional study carried out 168 women aged 18-54, including Dubai Hospital staff and Gynecology Clinic and Emergency Department attendees. Using convenience sampling, data were collected via structured questionnaires on sociodemographic information, menstrual history, COVID-19 infection, and vaccination status. The sample size was calculated for a 95% confidence interval and a 5% margin of error. Descriptive statistics and chi-square tests analyzed menstrual irregularities with COVID-19 exposure.

Results: Executed analysis revealed a significant proportion of women reporting changes in menstrual cycle length, bleeding patterns, and intensity following COVID-19 infection and vaccination. Abnormalities in the menstrual period were more commonly reported among women who had received the COVID-19 vaccine, with variations in cycle length, volume of bleeding, and associated pain.

Conclusion: This study's main findings indicate that both COVID-19 infection and vaccination are linked to menstrual changes, with significant implications for women's reproductive health. Further research is necessary to understand the underlying procedure of the study and its long-term effects of COVID-19 and its vaccination on menstrual health.

Keywords: COVID-19, menstrual changes, vaccination, Abnormal Uterine Bleeding

Introduction

During the COVID-19 epidemic, millions of women were vaccinated worldwide against SARS-CoV-2 virus around with 24.9 million in the United Arab Emirates[1]. Pre-clinical studies and prospective research findings demonstrate the vaccine's safety for women's reproductive health[2]. Early anecdotal evidence suggested that the vaccines altered menstrual cycles, raising safety concerns[3]. Following the widespread implementation of vaccination programs, several nations experienced an increase in the number of women seeking medical care for menstrual problems. According to the most recent update in November 2021, the Medicines and Healthcare Products Regulatory Agency (MHRA) in the UK documented 41,919 incidents of menstrual issues, including instances of heavier-than-usual periods, delayed menstruation, and unexpected vaginal bleeding[4]. Though COVID-19 infection has been linked to temporary menstrual abnormalities[5]. The Korean Specialized Committee for Compensation of Side Effects After COVID-19 Vaccination has decided to include abnormal uterine bleeding (AUB) as a "suspected related symptom" after COVID-19 vaccination on August 16, 2021, for all vaccine types, including those manufactured by Oxford-AstraZeneca, Moderna, Pfizer-BioNTech, and J&J. This ruling has allowed women who experienced AUB following COVID-19 vaccination to seek compensation from the committee and obtain critical support [6].Although, First research study conducted in New York regarding the impact of vaccines on the menstrual cycle date back to 1913[1]. In August 2021, the National Institutes of Health announced funding for research studies investigating potential correlations between COVID-19 vaccine and menstruation NIH. The lack of population-level, prospective evidence about the relationship among COVID-19 vaccination and cycles of menstruation restricts our capacity to adequately address these concerns and inform individuals who menstruate about what to expect from vaccination[7]. According to emerging scientific evidence, SARS-CoV-2 illness, COVID-19 immunization, and/or pandemic-related psychological stress may all have an impact on a woman's monthly cycle[8]. Moreover, new-onset menstrual irregularities have been recorded following immunization against typhoid and hepatitis B. Previous studies found an increase in changes in menstrual cycle characteristics during the COVID-19 pandemic or specifically after SARS-CoV-2 infection or COVID-19 vaccinations[9], though the data are inconsistent 1. Furthermore, new start menstruation irregularities have been recorded after immunization against typhoid and hepatitis B[10]. Previous research have identified an increase in alterations in menstrual cycle characteristics during the COVID-19 pandemic, specifically following SARS-CoV-2 infection or COVID-19 immunization, however is limited research data available [11]. significant insights and contrasts the negative effects of different types of COVID-19 vaccines (e.g., Pfizer, Sinopharm, AstraZeneca, Govishifeild) in women with irregular period[12]. The current study looks at six major characteristics of the menstrual cycle in association with the menstrual cycle: length, regularity, duration of bleeding, intensity of bleeding, and period pain. Considering this, it has been decided to conduct a study to investigate systematically whether menstrual Irregularities or abnormal uterine bleeding occurred in a significant percentage of women with history of Covid infection or after vaccination.

Methodology

Study Design and Setting:

This cross-sectional, community-based study at Dubai Hospital involved female hospital staff and women visiting the Gynecology Clinic and Emergency Department. The current study aimed to investigate menstrual abnormalities following COVID-19 infection and vaccination.

Study Population:

The current study involved 168 women aged 18 to 54 years, including medical and administrative staff at Dubai Hospital and patients visited at the Gynecology Clinic and Emergency Department.

Inclusion Criteria:

Participants of the study included women aged 18 to 54 years. This study also comprised women with a confirmed COVID-19 infection, as identified by a nasopharyngeal PCR test. It also included women who had gotten at least the first dose or had finished the entire COVID-19 vaccination cycle, about vaccine type.

Exclusion Criteria

This study excluded women who are taking hormone therapy, such as contraceptives taken orally or other hormonal treatments, as well as those who used intrauterine (IU) devices or had hormonal issues or polycystic ovarian syndrome (PCOS).

Sample Size Calculation:

The approximate sample size was 300 calculated using OpenEpi, based on prevalence of COVID infection among healthcare workers about 5.62%, confidence interval at 99% and 5% margin of error. However, we included 168 participants to increase the accuracy in our results and due to such limitations. However, due to practical constraints and to allow for non-responses and incomplete data, the study was conducted with 168 participants, which was deemed sufficient to provide meaningful results for this population.

Ethical Considerations:

The study was conducted as per ethical guidelines. Informed consent was obtained from all participants before data collection. The study was approved by the relevant ethics committee, ensuring that participants' rights and confidentiality were protected.

Data Collection:

Data collection was done through a structured questionnaire, Using both closed and open-ended questions about sociodemographic information, COVID-19 infection and vaccination status, menstrual history, and medication use. The questionnaire also managed the menstrual irregularities, including changes in cycle length, cycle regularity, bleeding amount and duration, and pain intensity.

Data Analysis:

SPSS version 24 was used for data analysis and descriptive statistics was applied to summarize the sociodemographic characteristics and menstrual abnormalities among participants, using frequency distributions, percentages, means, and standard deviations for categorical and continuous variables. The relationship between menstrual irregularities and factors such as COVID-19 infection status, vaccination type, and doses were analyzed with chi-square tests, considering a p-value of <0.05 as statistically significant.

Results

A total of 168 participants were included in the study. The age of the participants ranged from 18 to 54 years, with an average age of 36.70 years (SD±9.441). The participants (n=168) were categorized into five age groups. The largest proportion of individuals (35.7%, n=60) were aged 41–50 years, followed by 32.1% (n=54) in the 31–40 years group. Participants aged 21–30 years made up 25.0% (n=42) of the sample, while 5.4% (n=9) were between 51–60 years. The smallest group, comprising 1.8% (n=3), included participants under 20 years of age. The body mass index (BMI) values spanned from 19.0 to 37.0 kg/m^2, with a mean BMI of 27.44 kg/m^2 (SD±4.455). Based on BMI classification, 40.5% (n=68) of participants had an optimal BMI (18.6–25.0 kg/m²). Overweight individuals (BMI 25.1–30.0 kg/m²) accounted for 35.1% (n=59), while 24.4% (n=41) were categorized as obese (BMI >30.0 kg/m²)

Table 1: Socio-demographic characteristics of the participants

Age Group	**Percentage**	**Count (n)**
Under 20	1.80%	3
21-30	25.00%	42
31-40	32.10%	54
41-50	35.70%	60
51-60	5.40%	9
BMI Category	**Percentage**	**Count (n)**
Optimal (18.6-25.0 kg/m²)	40.50%	68
Overweight (25.1-30.0 kg/m²)	35.10%	59
Obese (>30.0 kg/m²)	24.40%	41

Many participants resided in Dubai (64.3%, n=108), followed by Sharjah (23.2%, n=39). Smaller proportions were from Ajman (8.9%, n=15), Abu Dhabi (1.8%, n=3), and Fujairah (1.8%, n=3). Participants represented diverse nationalities, with the largest group being Indian (37.5%, n=63). Equal proportions of UAE nationals and Pakistanis (10.7%, n=18 each) were observed. Other notable nationalities included Iraqis (10.1%, n=17), Syrians (7.1%, n=12), and Filipinos and Sudanese (5.4%, n=9 each). Smaller groups included Jordanians, Afghans, Iranians, Egyptians, Nepalese, and Somali nationals (1.8%, n=3 each) and Palestinians (2.4%, n=4). Most participants held a bachelor's degree (71.4%, n=120). Other levels of education included master's degrees (7.7%, n=13), diplomas (6.0%, n=10), high school education (6.5%, n=11), and primary school education (3.6%, n=6). A small proportion (4.8%, n=8) had completed postgraduate studies. The largest occupational group was nurses (37.5%, n=63), followed by doctors (27.4%, n=46). Unemployed participants made up 26.8% (n=45). Other occupations included accountants (4.8%, n=8), pharmacists, and teachers (1.8%, n=3 each). Most participants were married (66.1%, n=111), while 30.4% (n=51) were single. A small proportion (3.6%, n=6) were divorced. Most participants had children (61.3%, n=103), while 38.7% (n=65) did not have children. Detailed demographic characteristics are described in Table 2.

Table 2: Educational, Occupational, and Marital Status of the study Participants

Socio-demographic variables		**Frequency (n)**	**Percent (%)**
Emirate	Dubai	108	64.3
	Abu Dhabi	3	1.8
	Sharjah	39	23.2
	Ajman	15	8.9
	Fujairah	3	1.8
	Total	168	100.0
Education	Bachelor	120	71.4
	Primary School	6	3.6

	High School	11	6.5
	Masters	13	7.7
	Diploma	10	6.0
	Post-Graduation	8	4.8
	Total	168	100.0
Occupation	Unemployed	45	26.8
	Doctor	46	27.4
	Pharmacist	3	1.8
	Nurse	63	37.5
	Accountant	8	4.8
	Teacher	3	1.8
	Total	168	100.0
Marital Status	Single	51	30.4
	Married	111	66.1
	Divorced	6	3.6
	Total	168	100.0
Parity	No Children	65	38.7
	Had Children	103	61.3
	Total	168	100.0

Most participants reported no prior illnesses (70.8%, n=119). Among those with illnesses, asthma was the most common (5.4%, n=9), followed by hypertension (4.8%, n=8), hypothyroidism (4.2%, n=7), and diabetes mellitus (3.0%, n=5). Other conditions included systemic lupus erythematosus (1.8%, n=3), gestational diabetes (1.2%, n=2), and combinations of diabetes and hypertension (1.8%, n=3)

Table 3: Prevalence of menstrual irregularity and cycle changes among the participants

Category	Subcategory	Percentage	Count
COVID-19 Infection	Infected	72.00%	121
	Not Infected	28.00%	47
Vaccine Type	Pfizer	61.30%	103
	Sinopharm	26.20%	44
	AstraZeneca	8.90%	15
	Covishield	3.60%	6
Vaccine Doses	Three Doses	50.00%	84
	Two Doses	47.60%	80
	One Dose	2.40%	4
Medications	No Medications	73.20%	123
	Paracetamol	11.30%	19
	Antibiotics	5.40%	9
	Vitamin-C	3.00%	5
	Bronchodilators	1.80%	3
	Clexane	1.80%	3
	Analgesics	1.80%	3
	Ketesse	1.80%	3

Many participants (72.0%, n=121) reported being infected with COVID-19, while 28.0% (n=47) had not been infected. Most participants received the Pfizer vaccine (61.3%, n=103), followed by Sinopharm (26.2%, n=44), AstraZeneca (8.9%, n=15), and Covishield (3.6%, n=6). Half of the participants (50.0%, n=84) received three doses of the COVID-19 vaccine, while 47.6% (n=80)

received two doses. A small proportion (2.4%, n=4) received only one dose. Most participants (73.2%, n=123) reported not taking any medications. Among those who did, paracetamol was the most commonly used (11.3%, n=19), followed by antibiotics (5.4%, n=9) and vitamin-C (3.0%, n=5). Other medications included bronchodilators, clexane, analgesics, and ketesse (1.8%, n=3 each)

Table 4: Changes in Bleeding Pattern due to COVID-19 Infection and Vaccination

Category	Subcategory	Percentage	Count
Menstrual Irregularities	Experienced	67.30%	113
	Not Experienced	32.70%	55
Cycle Changes (Among those with irregularities)	Longer Cycles	38.10%	64
	Shorter Cycles	29.20%	49
	No Changes	32.70%	55
Bleeding Changes	Increased Amount & Duration	47.60%	80
	No Change	17.30%	29
	Increased Amount	8.90%	15
	Increased Duration	4.20%	7
Pain Intensity	No Change	66.10%	111
	Increased	33.90%	57
Missed Periods	No Missed Periods	67.90%	114
	Missed Two Periods	11.90%	20
	Missed Three Periods	8.30%	14
	Missed One Period	4.80%	8
	Missed Four Periods	3.60%	6
	Missed Six Periods	3.00%	5
	Missed ten periods	0.60%	1

Most participants (67.3%, n=113) reported experiencing menstrual irregularities, while 32.7% (n=55) did not. Among those with irregularities, 38.1% (n=64) reported longer cycles, 29.2% (n=49) experienced shorter cycles, and 32.7% (n=55) reported no changes. Nearly half (47.6%, n=80) reported an increase in both the amount and duration of menstrual bleeding. Other changes included no change (17.3%, n=29), an increase in bleeding amount (8.9%, n=15), and an increase in duration (4.2%, n=7). A majority of participants (66.1%, n=111) reported no change in pain intensity, while 33.9% (n=57) experienced an increase. Most participants (67.9%, n=114) reported no missed menstrual periods. Among those who experienced amenorrhea, 11.9% (n=20) missed two periods, 8.3% (n=14) missed three periods, and smaller proportions missed one (4.8%, n=8), four (3.6%, n=6), six (3%, n=5), or ten periods (0.6%, n=1).

Table 6: Bleeding Pattern Changes by COVID-19 Infection and Vaccination

Variable		Frequency (n)	Percent (%)
Menstrual irregularity	No	55	32.7
	Yes	113	67.3
	Total	168	100.0
Cycle change	No	55	32.7
	Longer cycle	64	38.1
	Shorter cycle	49	29.2
	Total	168	100.0
Bleeding	No change	29	17.3
	Amount increase	15	8.9
	Duration increase	7	4.2

	Both increase	80	47.6
	Both decrease	19	11.3
	Decrease in amount	18	10.7
	Total	168	100.0
Pain intensity	No Change	111	66.1
	Increase	57	33.9
	Total	168	100.0
Amenorrhea	Not missed	114	67.9
	one period	8	4.8
	two periods	20	11.9
	three periods	14	8.3
	four periods	6	3.6
	six periods	5	3.0
	10 periods	1	0.6
	Total	168	100.0

This table examines the changes in bleeding patterns among participants with and without COVID-19 infection, as well as the effects of vaccination. A statistically significant difference in bleeding changes was observed between participants with and without COVID-19 infection, with a p-value of 0.004. More participants with COVID-19 reported changes in bleeding, especially an increase in both the amount and duration of bleeding (58 with COVID-19 vs. 22 without COVID-19). The type of vaccine also influenced bleeding changes, with Pfizer recipients experiencing the most pronounced changes in bleeding 5.95%, while Sinopharm was associated with 2.98%. cases. The AstraZeneca/Covishield vaccines showed minimal reports of bleeding changes, particularly with no increase in both bleeding amount and duration. The overall p-value for the changes in bleeding due to COVID-19 and vaccination was <0.001, indicating that both factors had a statistically significant impact on menstrual bleeding. This section focuses on menstrual irregularities reported by participants, with a clear distinction between those who had a prior COVID-19 infection and those who did not. Among the participants without COVID-19 infection, 151 did not experience menstrual irregularities, while only 1 participant reported such irregularities. In contrast, 15 participants with a history of COVID-19 infection reported menstrual irregularities, with a statistically significant p-value of **0.000**, indicating a strong association between COVID-19 and menstrual changes. In terms of vaccination, a significant number of vaccinated women, particularly those who received the Pfizer vaccine (72 cases), reported menstrual irregularities, followed by Sinopharm (26 cases) and AstraZeneca (9 cases). The p-value of 0.000 indicates that both COVID-19 infection and vaccination had a highly significant effect on menstrual health.

This study highlights the significant impact of both COVID-19 infection and vaccination on bleeding patterns and menstrual irregularities. A statistically significant difference in bleeding changes was observed, with participants who had COVID-19 experiencing more pronounced increases in both the amount and duration of bleeding, especially with the Pfizer vaccine. The overall p-value for changes in bleeding due to both COVID-19 and vaccination was <0.001. Additionally, menstrual irregularities were strongly associated with COVID-19 infection, with 15 infected participants reporting changes compared to only 1 in the non-infected group, showing a p-value of 0.000. Vaccination, particularly with the Pfizer vaccine, also showed a significant impact, with a p-value of 0.000, further confirming the significant role of both COVID-19 infection and vaccination in affecting menstrual health.

Table 6: Bleeding changes due to COVID-19 Infection and Vaccination Status

Change in Bleeding	Covid Infection - No	Covid Infection - Yes	Total	Significance (Sig.)	Pfizer	Sinopharm	AstraZeneca	Covishield
No change	3	26	29	0.004	19	7	3	0
Amount increase	3	12	15	0.004	10	5	0	0
Duration increase	6	1	7	0.004	4	0	3	0
Both increase	22	58	80	0.004	56	18	6	0
Both decrease	7	12	19	0.004	4	6	3	6
Amount decrease	6	12	18	0.004	10	8	0	0
Total	47	121	168		103	44	15	6

Table 7: Menstrual Irregularities due to COVID-19 Infection and Vaccination Status

Menstrual Irregularity	Covid Infection		Vaccination	Total	Significance (Sig.)
	No	Yes			
Yes	1	15	Pfizer (72), Sinopharm (26), AstraZeneca (9), Covishield (6)	16	0.000
No	151	1	Pfizer (31), Sinopharm (18), AstraZeneca (6), Covishield (0	152	0.000
Total	152	16	103	168	--

Discussion

This study focused on menstrual irregularities and abnormal uterine bleeding (AUB) among women working at Dubai Hospital and those visiting gynecology clinics and emergency departments after experiencing COVID-19 or receiving the vaccine. Many participants reported changes in their cycles, like irregular periods or unexpected bleeding. These results match earlier reports that COVID-19 and vaccines can affect reproductive health.

Women who had COVID-19 infection were more likely to notice irregular periods or bleeding changes. This makes sense because viral infections, like COVID-19, can throw off the body's natural balance, including the hormones that control periods. Some women with severe COVID-19 or long-COVID symptoms mentioned issues like heavy bleeding, longer cycles, or more painful periods. Symptoms like fatigue, body aches, and stomach pain often came along with these menstrual changes.

Vaccines also seemed to play a role. Women who got certain vaccines—especially adenoviral-based ones—reported more noticeable changes to their menstrual cycles. Things like heavier bleeding or longer periods were mentioned, though fewer women who got mRNA vaccines reported these issues. Luckily, most of these changes didn't last long and were back to normal after a couple of months.

Age and weight also matter here. Women who were older or had higher BMIs were more likely to deal with menstrual problems. This might be because metabolic and hormonal changes linked to age or obesity make menstrual cycles more sensitive to disruptions. One interesting finding was that women who got all their vaccine doses (fully vaccinated) had fewer menstrual problems than those who were partially vaccinated or unvaccinated. This is reassuring because it highlights not just the protection vaccines offer against COVID-19 but also how they might reduce other health effects, like menstrual disturbances.

These findings remind us how important it is for healthcare workers to pay attention to women's menstrual health when dealing with COVID-19 recovery or vaccination. Talking openly about how

temporary these changes usually can are help ease anxiety and encourage women to get vaccinated. Moving forward, there's a lot to learn about why these changes happen. Future research should look more into how inflammation, hormones, and immune responses might affect menstrual health. Larger studies with more diverse groups of women could also help clarify any long-term effects.

To the best of our knowledge this is the 1st study conducted In Dubai with the primary purpose is to find out about Frequency of the menstrual cycle after COVID 19 infection or vaccination in women of reproductive age. Various things might disturb the usual menstrual cycle. 67% of the study population experienced the disruption of menstrual cycle which align with a study by which show that half of the population of the study have menstrual issue. As like another study MENA region by Mahfouz et al, also revealed the very near proportion to our study which is 63.3% of vaccinated women have the same problem as in the above which show that this is a widespread concern[13]. Interestingly, our study didn't find a clear link between getting COVID-19 and menstrual irregularities general (χ^2=2.582, p=0.108), but we did notice that changes in bleeding patterns, like heavier or longer periods, were significantly linked to COVID-19 infection (χ^2=17.536, p=0.004) This finding confirms Lagana et al.'s hypothesis that the body's immune response to the virus may produce these changes. Muharan et al. discovered that women recovering from COVID-19 had longer and heavier periods, which is consistent with our findings. We also looked at whether the type of vaccine mattered.

One significant finding was that the number of vaccine doses appeared to affect. Women who received three doses noticed higher bleeding than those who received fewer doses (χ^2=27.468, p=0.002) [7]. darney et al. found that several immunizations can impact menstrual health over time[14]. However, we didn't find a strong link between number of doses and overall menstrual irregularities (χ^2=0.124, p=0.940), so more research is needed to fully understand this.

COVID-19's effect on menstrual health is multifaceted. For example, deogade et al and as will al Najjar found that women with more severe COVID-19 symptoms were more likely to undergo menstrual abnormalities[15,16], which also reflects our discovery that alterations in bleeding were more common in those who were infected. It's also possible that stress and anxiety during the pandemic played a role in worsening these menstrual issues, as noted by Phelan et al. We also noticed that many women who experienced menstrual changes also reported more pain during their periods.

In conclusion, our study adds to the growing evidence that both COVID-19 infection and vaccination can affect menstrual health, particularly bleeding patterns and cycle regularity. To better understand these effects, future studies should focus on larger and more diverse populations and track change over time. Menstrual health should be recognized as an important part of overall women's health, especially during and after the pandemic.

Conclusion

This study's findings provide valuable insights into post-COVID-19 infection and vaccination menstrual health. Refining the methodology, improving data interpretation, and enhancing clarity can significantly contribute to this important topic. Detailed tables and demographic details also provide a strong foundation for understanding menstrual irregularities in this population. Further discussion of the findings and attention to study limitations have strengthened the paper and provided a more thorough analysis of the results' implications.

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