



Impact of Covid-19 Vaccination on Menstrual Health in Indian Females

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ABSTRACT

Menstrual cycle is an important aspect in human female's life and may have minor variations; major variations are manifestations of severe physiological/psychological disturbances and may need intervention. Continuous outbreak of microbial/viral infections is hampering health and to combat there is regular development of vaccines; which may affect menstrual cycle adversely. Amidst Covid-19 pandemic, a global vaccination drive is underway to secure public health. The study aims to understand the correlation between Covid-19 vaccination and menstrual health through cross-sectional online survey in 1260 Indian females. Results suggested that no adverse changes/symptoms were reported by the participants in their menstrual health post-Covid-19 vaccination and therefore no hesitation must be made by females for Covid-19 vaccination.

Keywords: Menstrual cycle, Menstrual irregularities, Pandemic, Covid-19, Vaccination.

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INTRODUCTION

Female reproductive health has become a matter of concern globally in the last decade and menstrual parameters are one of the primary indications of female reproductive health & general wellbeing. It has been studied, that various disorders and irregularities are associated with menstruation like menorrhagia (heavy bleeding), metrorrhagia/polymenorrhagia (frequent bleeding), dysmenorrhea (cramps and pelvic pain), worsened PMS (premenstrual syndrome), post-menopausal bleeding are not only the indicators of reproductive issues but they also affect the mental health and quality of life.¹ Menstrual cycle is affected by many factors including stress, weight gain/loss, hormone, stress, depression, sleep disturbances, physical stress etc.² Also, the hypothalamic-pituitary-gonadal axis is very sensitive to persistent stress and manifests as irregular or disturbed menstrual cycle.^{2,3} Viral infections like HBV (Hepatitis B virus) or HCV (Hepatitis C virus) are reported to be associated with menstrual disorders, reproductive complications like pregnancy loss and infertility.⁴ Also, viral infections are known to affect the immune system of the host and lead to increase in interleukins (IL), tumour necrosis factor (TNF) and various cytokines thus causing stress and ultimately lead to hormonal disturbances.⁵ Covid-19 is caused by SARS-CoV-2 (Severe acute

respiratory syndrome Coronavirus 2) and amidst pandemic there are various reports mentioning that it affects multiple aspects of menstruation, primarily by increased psychological stress and thus disturbing hypothalamic-pituitary axis.^{2,6}

It has been reported that 25% of studied females had varied menstrual volume during Covid-19 infection.⁷ McNamara 2020, reported that during the pandemic, 20% of female athletes experienced changes in length of menstrual cycles and could be a result of psychological stress.⁸ Although, there is no clinical data available on the impact of the same on ovarian functions directly.^{4,7} The, World Health Organization (WHO) has issued various guidelines at regular intervals to contain the spread of Sars-CoV-2 virus, which includes wearing masks, social distancing, use of well-ventilated spaces, maintaining hygiene, healthy lifestyle, and vaccination. Vaccination is known to be the most cost-effective life-saving method against various viral and microbial infections by eliciting immune responses.^{5,9} Also, to end the coronavirus pandemic, vaccination remains the single most effective means to reduce fatalities and severe illness. However, it has been reported that Covid-19 vaccine administration may cause haemorrhage, blood clots and thrombocytopenia with pre-existing coagulation disorders or with certain medications.¹⁰ Still, the benefits of vaccination outweigh the minuscule risks/side effects associated with vaccination. Apart from the scientific point of view, there is a lot of vaccine hesitancy in people especially in developing countries like India. People have different myths like vaccination can lead to death, male or female infertility etc.

Therefore, it is of utmost importance to survey and generate data about the impact of vaccination on various



aspects so as to mitigate these myths and false beliefs. It is also imperative to create awareness among the general public to report any complications for successful policy making. Menstrual health is one such parameter, which needs to be studied. There are reports for a range of menstrual disorders after three of the COVID-19 vaccines (Pfizer, Moderna and AstraZeneca) administration. These include delayed periods, heavier than usual periods and unexpected vaginal bleeding.¹⁰ As reported by MHRA, UK, 2021, the occurrence of these menstrual disorders is not significant in terms of the number of females reporting in comparison to the ones who have been administered and also in terms of the background rate of menstrual disorder in the population.^{10,11} It is of primary importance to closely monitor the correlation between Covid 19 vaccination and menstrual disturbances because there can be a possibility of activated immune responses attacking host immune cells and inflammatory molecules in the uterus, further affecting menstrual cycle.¹² To best of our knowledge, till now there is no clinical data available (to our knowledge) for post vaccination menstrual changes/disturbances (for the vaccines that are being administered in India). Thus, the present study is aim to ascertain if there is any correlation between vaccination and menstrual disturbances.

MATERIAL AND METHODS

Sample Size and Data Collection

A random online survey was conducted in the month of June 2021-December 2021, with 1260 Covid-19 vaccinated female subjects belonging to age groups (18-50 years of age) residing in various regions of India. An online google form was designed with 14 (13 close-ended and one non-specific) questions to generate information. The participation was absolutely voluntary; Informed consent was taken from each participant for the use of data in research and publication while maintaining anonymity. The study is purely based on online survey and doesn't involve any clinical intervention or clinical data. The Helsinki Declaration has been followed.

Questionnaire

A questionnaire with 13 close-ended and 1 open-ended questions was designed as online google form and shared via Gmail, WhatsApp to knowns, acquaintance for obtaining the information about age, residence status, vaccine type and dose taken, prior reproductive/menstrual health issues, pre- and post-vaccination menstrual health. 1260 responses were collected however 50 responses were ignored for analysis due to ambiguity in the responses.

Data Analysis

Data was collected, compiled and analysed by simple percentage (%) statistics. All values rounded off to two decimal places.

RESULTS

In the present study, 1260 vaccinated females of age 18-50 years were surveyed through online google form. 1210 eligible respondents were included for the study after excluding 50 respondents with ambiguous data. The age group was selected on the basis of minimum age for vaccination and average maximum age for menopause. Maximum number of subjects (72.73%) belonged to the age group 18-30 years, 170 (~14.04%) were in the age group of 31-40 years and 160 (~13.22%) were in the age group of 41-50 years (fig. 1A). 320 (26.45%) respondents were married and 890 (73.55%) respondents were unmarried (includes 2 undisclosed respondents (fig. 1B). All of the respondents were formally educated except a few respondents, with educational qualification as follows: 420 (34.71%) were postgraduate, 590 (48.76%) were graduate, 190 (15.70%) were high school pass (fig. 1C).

The subjects included in study have been vaccinated with either single (85.95%) or both the doses (14.05%) as per the availability and recommended time period gap between both the two doses at the time of study (fig. 2A). 80.2% subjects have been vaccinated with Astra-Zeneca's Covishield and remaining 19.8% with Bharat Biotech, India's Covaxin (fig. 2B). The variation in vaccine and doses taken is due to difference in availability, choice of both the vaccines along with the vaccination drive for various age groups.

A majority (85.12%) of subjects had no reproductive issue before vaccination, however 12.39% had reported PCOS, 1.65% Endometriosis, 0.82% cystic development and 2.47% had other issues (fig. 2C). Out of 1210 subjects, 1020 females (84.30%) have regular and rest 190 (15.70%) have irregular menstrual cycle before vaccination (fig. 3A). From the above 190 female subjects, 160 (~13.22%) had delay in their periods whereas 30 (~2.48%) females had their periods earlier than expected. As they were experiencing irregularity in menstruation pre-vaccination, 170 of them were not included in the post vaccination analysis (refer discussion).

There were 210 (17.36%) subjects who reported irregularity in menstrual cycle post-vaccination; 90 (~7.44%) individuals reported preponed periods and 100 (8.26%) reported delayed periods (fig. 3B). Surprisingly, there was ten subject who reported that they had a history of delayed periods but after vaccination they had periods earlier than expected. Similarly, another few subjects (10) had a history of early periods before vaccination but after vaccination they had delayed periods. The change in menstrual flow was observed in the 230 (~19.01%) subjects with regular periods. Out of these 230 respondents, 100 (8.26%) and 130 (10.74%) individuals have reported lower and more than normal discharge, respectively (fig. 3C).



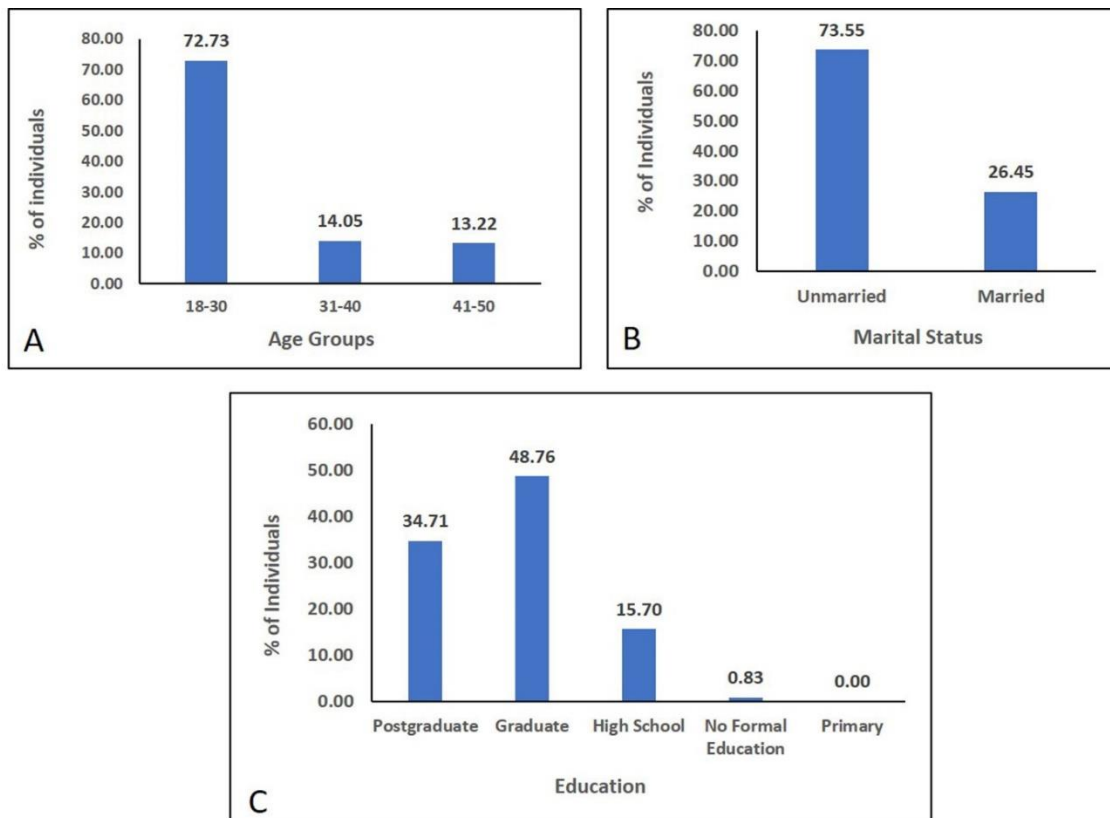


Figure 1: The percentage of the female participants (a) in different age group, (b) their marital status and (c) their education.

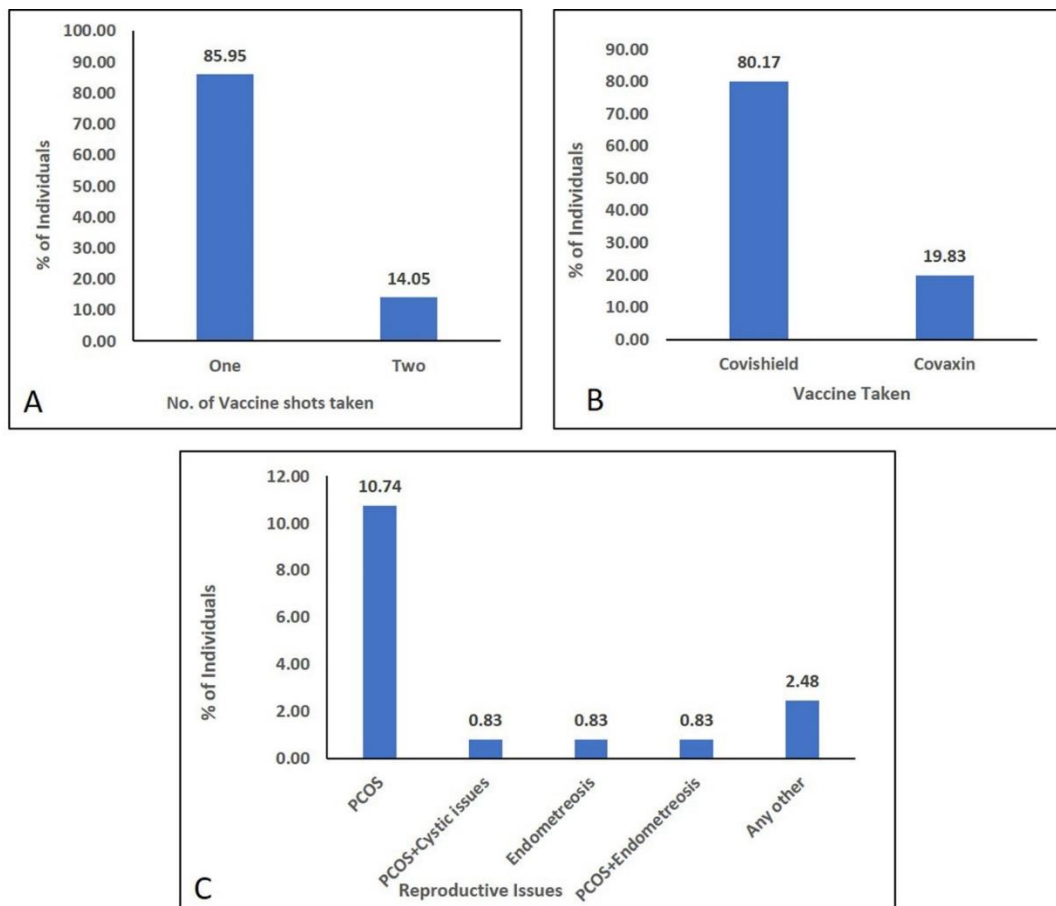


Figure 2: The percentage of the female participants with (a) number of vaccine doses taken, (b) name of the vaccine taken and (c) different reproductive issues.

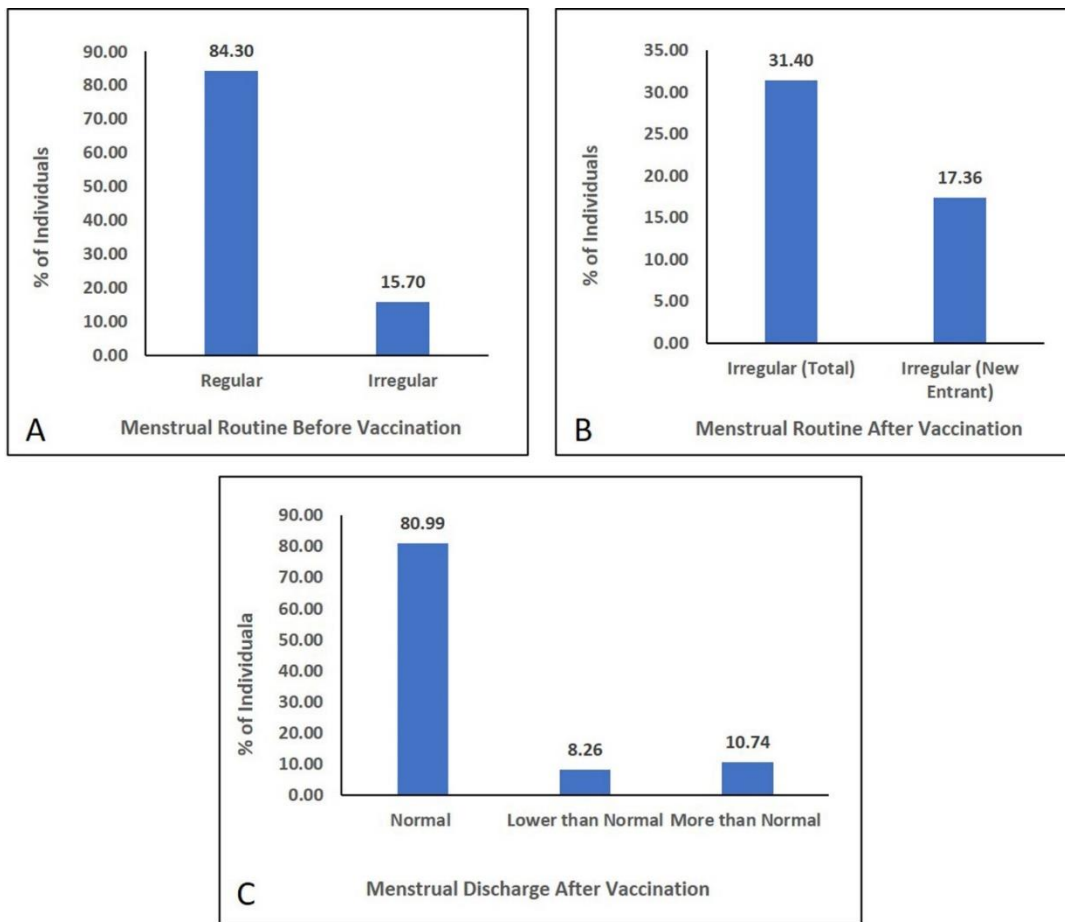


Figure 3: The percentage of the female participants with (a) menstrual routine before vaccination, (b) menstrual routine after vaccination and (c) menstrual discharge after vaccination.

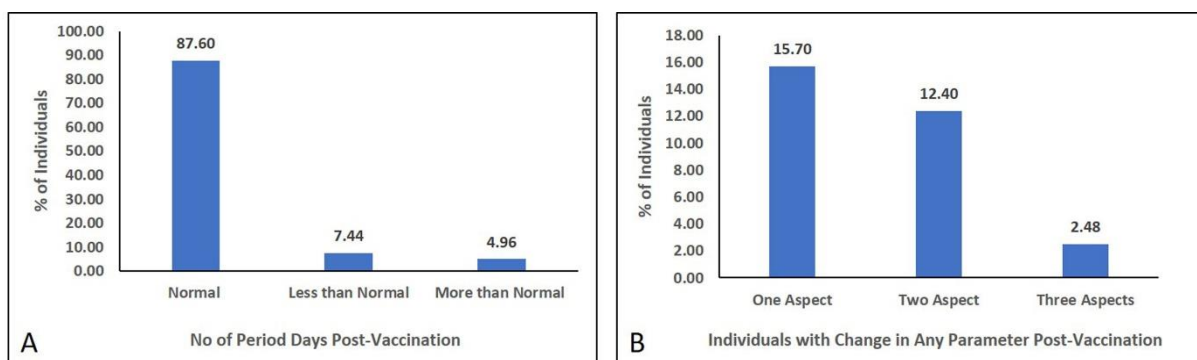


Figure 4: The percentage of the female participants with (a) number of period days post vaccination and (b) change in one, two or three parameter/s post vaccination.

The duration of periods was also changed for 150 (12.40%) subjects, 90 (~7.44%) and 60 (4.96%) have reported lesser and a greater number of periods days, respectively (fig. 4A). If we focus on multiple variation in the respondents for various parameters like, (i) regularity, (ii) discharge and (iii) number of days of periods; it has been noticed that 190 (15.70%) respondents reported change in any one of the aspects, 150 (12.40%) respondents reported change in any two aspects, and 30 (2.48%) respondents reported change in all three aspects (fig. 4B). So, it can be concluded that there were 180 respondents who had changes in two or

more aspects of menstrual health. Moreover, one of the respondents reported increased levels of period discharge; three of the respondents reported variable PMS and one reported ~10 days delay in periods post vaccination but none of the respondents reported any major adverse event in subsequent menstrual cycle.

In the present study none of the respondents reported development or severity of any persisting/new issues post-vaccination, this signifies that Covid-19 vaccination doesn't impact on menstrual health in Indian women adversely.

DISCUSSION

To the best of our knowledge, this is the first study to investigate the probable link (if any) between Covid-19 vaccination and menstrual health in the Indian women. The main highlight of the present study was that respondents were surveyed about their menstrual health pre- and post-vaccination to compare the changes. Vaccination is an important goal of government to save the nation by strengthening public health system. Nationwide lockdown amidst Covid-19 pandemic impacted not only health but also impacted general economy, business, industry, education, tourism and ultimately livelihood. During earlier bacterial/viral pandemic or endemics, vaccination was found to be the effective way of containment and saved millions/billions of individuals.^{13,14} The current Covid-19 pandemic is another such infectious disease where mass vaccination is the only sustainable major and awareness is being generated for the same through social media. It is moral responsibility of every citizen to participate in the vaccination drive to eradicate the deadly virus.

Covid-19 vaccines are developed, tested in very short period of time and have proved to be efficacious and safe. Covid 19 vaccines were approved for the use of the general public by the late 2020 and early 2021 across different countries. But mere development of efficacious and safe vaccines is not sufficient to end or slow down the current pandemic. Public acceptance and cooperation are the key to successful Covid-19 vaccination program and Covid-19 vaccine hesitancy have been studied globally.¹⁵

Few reports also reflect that COVID-19 vaccination hesitancy rates differ in different parts of the world and it is dependent on the perception of susceptibility to and severity of COVID-19 and many other socio-demographic characteristics such as education, income, occupation, sex and age.^{15,16,17} A recent survey from the United States shows 32% of participants were reluctant in taking the COVID-19 vaccine. The two main reasons for this reluctance were potential side effects and safety besides other reasons. The same may be the plausible cause for lower number of participants in the present study too. Females in particular are more hesitant in taking Covid 19 vaccines as they are more susceptible to myths and misinformation.^{15,18} Although there are various believes and hesitation for getting vaccination, one of the issues is menstrual health.

There may be variability in terms of severity of PMS, amount of menstrual discharge, number of days of periods etc. So, the variations in the menstrual cycle and periods are very common in the general population due to any of the above-mentioned conditions. In the present survey, it has been reported that only 210 females reported any change in menstrual feature post-vaccination in terms of irregularity, flow of discharge and number of days of periods respectively (fig. 3B-C, 4A). Twenty of the respondents reported that post-vaccination earlier cycle was reversed in terms of short or long cycle. It has been studied that there are 370 (30.58%) females who reported atleast change in one of the parameters of menstruation

viz, regularity, amount of flow or number of days of periods (fig. 4B); and out of these only 2.46% have change in all the three parameters. This reported minor changes/variations may be due to their own hormonal or physiological changes due to fear of pandemic during second way in India.^{2,7,8} These alterations and deviation are transient, as none of the respondent reported persistence in any of the parameter alterations. Therefore, it is strongly suggested (by authors) that every female must have Covid-19 vaccination without hesitation, as a very low number of individuals reported minor and transient changes that may be due to factors (as discussed earlier) other than vaccination.

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