

Perceptions and Experiences Regarding Personal Protective Equipment Usage and Menstrual Health and Hygiene among Female Healthcare Workers during COVID-19: A Cross-sectional Study at a Tertiary Care Hospital, Maharashtra, India

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ABSTRACT

Introduction: Female Healthcare Workers (FHCWs) played a crucial role during the Coronavirus Diseases-2019 (COVID-19) pandemic, diligently donning Personal Protective Equipment (PPE) to deliver essential care to patients. While PPE effectively shielded FHCWs from infections, it simultaneously imposed limitations on their ability to perform fundamental human activities, including using restrooms and managing menstruation. During menstruation, the restricted access to sanitary pads, combined with the challenges of working in PPE, heightened vulnerability among FHCWs, resulting in discomfort, distress, and a decline in work efficiency.

Aim: To assess the perceptions, experiences, and challenges of FHCWs regarding PPE usage while providing healthcare services during the COVID-19 pandemic. Additionally, it aimed to explore the challenges experienced in managing Menstrual Health and Hygiene (MHH) during the COVID-19.

Materials and Methods: A cross-sectional study was conducted in the western region of India at a tertiary care hospital of the medical college of Symbiosis International (Deemed to be University) in Pune, Maharashtra, India from September 2020 to November 2020. A total of 300 FHCWs who were assigned COVID-19 duties and utilised PPE were included. Data was collected through a semistructured proforma, covering topics on PPE usage, challenges encountered, personal experiences, and

the management of menstruation. The collected data underwent analysis using Statistical Package for Social Sciences (SPSS) software version 21.0, with a primary emphasis on descriptive statistics.

Results: A total of 194 (64.7%) perceived that PPE imparted protection, and 267 (89.1%) believed that work efficiency was compromised. Challenges reported by FHCWs while working in PPE included sweating, difficulty in making eye contact, triggers of headaches, nausea, and earaches. A total of 161 (53.9%) reported experiencing a menstrual cycle while on duty with COVID-19 patients, out of which 40 (24.8%) experienced irregular periods, 23 (14.2%) experienced premenstrual stress, and 98 (60.8%) suffered from dysmenorrhoea during menstruation. Additionally, 155 (96.4%) were unable to change sanitary pads, 18 (11%) had stained PPE suits, and 146 (99.9%) experienced challenges in the disposal of sanitary napkins.

Conclusion: Many FHCWs felt that PPE offered protection but also compromised work efficiency. Sweating, discomfort, and managing menstrual hygiene within PPE were common challenges encountered. Providing training on PPE usage, adjusting shift durations, implementing policies for the supply of sanitary pads, permitting breaks for changing, ensuring proper disposal arrangements, providing necessary medications and additional PPE if required, leaves, or creating alternative duty arrangements would be beneficial for FHCWs.

Keywords: Coronavirus diseases-2019, Human rights, Menstrual health and hygiene, Pandemic

INTRODUCTION

Ensuring menstrual health is essential for upholding the equality, rights, and dignity of women who menstruate. Unfortunately, it is often overlooked as a priority, leading to widespread challenges [1]. Women and girls worldwide experience period poverty, which includes limited access to sanitary pads, health education, and adequate Water, Sanitation, and Hygiene (WASH) facilities [1]. It is evident that Menstrual Health and Hygiene (MHH) are intricately linked to achieving the 17 Sustainable Development Goals (SDGs), spanning education, gender equality, poverty alleviation, health, and WASH [2]. However, a range of health, social, cultural, economic, and political factors act as barriers to achieving MHH, particularly in low- and middle-income countries [2]. Addressing these issues becomes increasingly significant for reaching the SDGs by 2030 [2]. In this context, it is crucial to recognise that menstrual health is

defined as the complete physical, mental, and social well-being in relation to the menstrual cycle [3]. The World Health Organisation (WHO) has recognised menstrual health as a prominent agenda in the Human Rights Council, acknowledging it as a critical health and human rights concern [4].

The background points to reflect on the MHH practices adopted by FHCWs when delivering care to patients during the COVID-19 pandemic. The recent global upheaval caused by the COVID-19 pandemic has shed light on the resilience and dedication of healthcare professionals around the world [5,6]. India, as the second-worst affected country, faced immense challenges but effectively managed the health crisis [7]. Healthcare workers, including clinicians, nurses, paramedics, and allied professionals, played a pivotal role from the onset of the pandemic, despite the looming risk of infection [8]. These dedicated individuals continued to provide

essential healthcare services during long and arduous shifts, all while relentlessly adhering to the PPE guidelines issued by the WHO [9]. Their tireless efforts during the COVID-19 emergency garnered global recognition through media coverage and academic literature. However, amidst the accolades and success stories, healthcare workers, especially FHCWs, faced a unique set of challenges. Although PPE was instrumental in shielding healthcare workers from infection, it had unintended consequences on their basic human activities. Issues such as dehydration, suffocation, breathlessness, headaches, and dermatitis emerged as side-effects of prolonged PPE usage [10]. Beyond the physical strains of PPE usage and the emotional toll of working untiringly in high-risk environments, FHCWs who menstruated faced an additional layer of complexity. For many FHCWs, menstruation became a logistical challenge. Access to menstrual hygiene products was often limited, as healthcare facilities were stretched thin, prioritising essential resources for patient care [1,11]. The result was that FHCWs had to manage their menstrual health amidst the turmoil of the pandemic, with inadequate facilities and resources at their disposal. They grappled with the pressures of managing menstruation while on official duties, exacerbated by the lack of access to menstrual hygiene products due to resource constraints [1]. This vulnerable and often ignored aspect of their lives intersected with the demanding and high-risk nature of their work.

A report by Plan International sheds light on the adverse impact of the COVID-19 pandemic on MHH conditions. It highlights the restrictions placed on access to menstrual hygiene products, price increases, and limited availability of WASH facilities for changing, cleaning, and disposal in communities [12]. Despite the critical importance of this issue, there is a noticeable dearth of research articles addressing the practice of MHH among FHCWs during such a pivotal time. The gap in the existing literature highlights the need for an in-depth study to comprehensively address these issues. The study aims to explore the perspectives of FHCWs regarding the safety and effectiveness of Personal Protective Equipment (PPE) while administering healthcare services to COVID-19 patients during the pandemic, to record the difficulties experienced by FHCWs in the context of wearing PPE and providing healthcare services, and to understand FHCWs' challenges in managing menstruation while delivering healthcare services using PPE in the pandemic.

Through these objectives, light is shed on these critical issues, paving the way for solutions that can improve the working conditions and overall well-being of FHCWs. In doing so, the intersection of menstrual health and healthcare work will provide an essential step towards upholding the rights and dignity of the women who stand on the frontlines of healthcare. The present research endeavor seeks to amplify their voices, contributing to a more equitable and sustainable future.

MATERIALS AND METHODS

A cross-sectional study was conducted in the western region of India at a tertiary care hospital of the medical college of Symbiosis International (Deemed to be University) in Pune, Maharashtra, India from September 2020 to November 2020. The study received approval from the Institutional Ethics Committee (IEC) under document no-SIU/IEC/177. Written informed consent was obtained from all willing respondents. A list of FHCWs (clinicians, nurses, allied healthcare staff) assigned to COVID-19 duty and using PPE was acquired from the hospital administration. The list included 425 staff, but a total of 300 FHCWs participated in the study through convenient sampling.

Inclusion and Exclusion criteria: FHCWs aged 18-45 years, who wore PPE and provided healthcare to COVID-19 patients, and were willing to provide written informed consent were included. Participants who had not experienced a menstrual cycle for the last two months or had been diagnosed with any gynaecological problems were excluded from the study.

Study Procedure

An interview schedule containing questions on participant characteristics, details of PPE usage, perceptions about PPE safety and efficacy, challenges while working in PPE, experiences during menstruation, and barriers in adopting MHH was utilised. It included two open-ended descriptive questions: on the challenges of managing menstruation while in PPE on duty and suggestions to improve the PPE. The tool was developed by the researchers, RY a public health researcher and MG a social scientist, informed by findings from a literature review. Two Medical Social Workers (MSW) from the Obstetrics and Gynaecology Department of the hospital conducted the interviews. They scheduled appointments with the FHCWs, explained the study, obtained consent, and conducted the interviews in the hospital. Each interview lasted 30-40 minutes. The tool underwent pilot testing with 10 participants before finalisation. Pilot testing helped identify issues in tool administration, refine question design and flow, enhance usability, validate the tool, and build confidence among the interviewers. It checked the accuracy and consistency of the tool, thus validating and assessing its reliability. The interview schedule has been provided in [Annexure-1].

STATISTICAL ANALYSIS

Data were entered into an Excel sheet and later transferred to SPSS (version 16.0) software for analysis. Descriptive statistics were used to calculate frequencies and measures of central tendencies (mean and mode). Data received on the open-ended questions were organised and summarised.

RESULTS

Characteristics of the respondents: According to [Table/Fig-1], out of the total participants, 197 (65.7%) were in the age group of 20-30 years, 79 (26.5%) were aged 31-40 years, and 24 (7.8%) were above 40 years. The sample constituted 85 (28.4%) clinicians, 120 (40.3%) staff nurses, and 95 (31.3%) allied healthcare staff.

Characteristics	n	Percentage (%)
Age (in years)		
20-30	197	65.7
31-40	79	26.5
>40	24	7.8
Total	300	100
Designation		
Clinician	85	28.4
Nurse	120	40.3
Allied healthcare staff	95	31.3
Total	300	100

[Table/Fig-1]: Characteristics of the respondents.

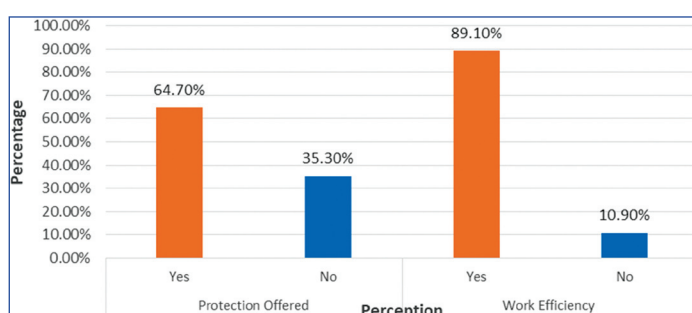
Duration of COVID-19 duty, type of PPE used, and number of hours of duty: A majority of the respondents, 191 (63.7%), reported performing duty in the COVID-19 wards for 0-5 months, and 109 (36.3%) reported engaging in the duty for 6-10 months. All 300 (100%) reported wearing the coverall type of PPE. Notably, 275 (91.7%) reported wearing the PPE suit for 6-9 hours a day on duty, and 15 (5%) reported wearing the PPE for 10-12 hours [Table/Fig-2].

Perception about protection offered by the PPE and effect on work efficiency: A total of 194 (64.7%) respondents agreed that PPE imparts protection when dealing with COVID-19 patients. Additionally, 267 (89.1%) responded that work efficiency is compromised while wearing PPE and working with COVID-19 patients, as shown in [Table/Fig-3].

Challenges experienced when using the PPE: All 300 (100%) respondents reported experiencing challenges while working in PPE suits. Specifically, 189 (63%) reported that donning PPE led

Parameters	n	%
Duration of the COVID -19 duty (in months)		
0-5	191	63.7
6-10	109	36.3
Total	300	100
Type of PPE used		
Surgical scrub pants and top	0	0
Surgical scrub gown	0	0
Coverall	300	100
Total	300	100
Number of hours of duty wearing PPE		
2-5	10	3.3
6-9	275	91.7
10-12	15	5
Total	300	100

[Table/Fig-2]: Duration of COVID-19 duty, type of PPE used and number of hours of duty.



[Table/Fig-3]: Perception towards protection offered by PPE and effect on work efficiency.

to a lot of sweating, causing discomfort. Additionally, 46 (15.3%) reported feeling of suffocation, 31 (10.4%) experienced headache, nausea, and earache, and 34 (11.3%) reported difficulty in speaking, hearing, and maintaining eye contact when using the PPE, as shown in [Table/Fig-4].

Challenges	n	%
Did you experience any challenges in using the PPE suit?		
Yes	300	100
No	0	0
Types of challenges experienced		
Sweating	189	63
Suffocation	46	15.3
Difficulty in hearing, speaking, keeping eye contact	34	11.3
Headache, nausea, earache	31	10.4
Total	300	100

[Table/Fig-4]: Challenges while wearing PPE and delivering healthcare to COVID-19 patients.

Experience of menstruation on duty during the COVID-19 in the last two weeks: The [Table/Fig-5] below reflects that more than 50%, 161 (53.6%), reported experiencing menstruation. Out of the 161 (53.6%), 40 (24.8%) experienced irregular periods during that time, and all 40 (100%) reported that they were not prepared for the periods. All 40 (100%) reported having access to sanitary pads from the hospital, while 23 (14.2%) and 98 (60.8%) experienced premenstrual stress and dysmenorrhoea during menstruation.

Practices and challenges of dealing with menstruation:

- Practices and hospital strategy regarding MHH:** A total of 155 (96.4%) reported that they were not able to change the sanitary pads while on duty during menstruation. Around 18 (10.9%) reported that their PPE suits were stained with menstrual blood. A total of 146 (99.9%) shared that they were unable to dispose-off

Experiences and challenges	n	%
Menses while on duty in the last 15 days		
Yes	161	53.6
No	139	46.4
Total	300	100
Were you prepared for the menstrual periods?		
Yes	0	0
No	40	100
Total	40	100
Did you had access to sanitary pads?		
Yes	40	100
No	0	100
Total	40	100
Symptoms related to menstruation		
Irregular periods	40	24.8
Premenstrual stress	23	14.2
Dysmenorrhoea	98	60.8
Total	161	100

[Table/Fig-5]: Experiences and challenges in managing menstruation while delivering healthcare.

the sanitary pads. The majority, 146 (95.1%), said it was difficult to visit the washroom while wearing the PPE [Table/Fig-6]. More than three-fourths, 232 (77.4%), reported that the hospital was well-equipped with WASH facilities. All 161 (100%) who menstruated in the last two weeks of the study reported that they were not given any consideration during COVID-19 duties. Additionally, 276 (92%) suggested having gender-specific PPE suits.

Practices and challenges	n	%
Were you able to change sanitary pads?		
Yes	6	3.6
No	155	96.4
Total	161	100
Were you able to dispose sanitary pads?		
Yes	15	1.1
No	146	99.9
Total	161	100
Was your PPE suit soiled because of the menses?		
Yes	18	10.9
No	143	89.1
Total	161	100
Was it comfortable to visit the washroom?		
Yes	15	4.9
No	146	95.1
Total	161	100
Was the hospital equipped with WASH facilities?		
Yes	232	77.4
No	68	22.6
Total	300	100
Were you given some consideration during your menstrual cycle from the COVID-19 duties?		
Yes	0	0
No	161	100
Total	161	100
Do you prefer gender-specific PPE?		
Yes	276	92
No	24	8
Total	300	100

[Table/Fig-6]: MHH practices and challenges of dealing with menstruation.

- **Challenges:** In response to an open-ended question about the challenges of working in PPE during menstruation, the FHCWs reported that wearing PPE causes discomfort during menstruation. They suffered severe itching, pain, and sweating around the internal organs. A few complained of abdominal pain and symptoms suggestive of Urinary Tract Infection (UTI). With the PPE, they could not visit the washrooms frequently to check the flow of bleeding or to change the sanitary pads. Fear of visiting the toilets made them hesitant to drink water, leading to dehydration and exhaustion at the end of the day.

Suggestions about the PPE: Suggestions were sought from the FHCWs about the design of the PPEs. A well-fitted PPE with a separate cap available in different sizes was a demand made by the majority. They also suggested a set of two PPE suits and extra time for bathing, donning, and doffing of the PPE. A middle-aged nurse suggested, "A preferred choice would be a PPE suit designed consisting of separate pants and a shirt. It should have a soft and lightweight textile material, with an emphasis on a longer shirt length, while avoiding plastic materials."

DISCUSSION

The study's findings indicated that most participants had confidence in the protective effect of PPE, yet they reported reduced work efficiency, along with challenges such as sweating, suffocation, hearing difficulties, and maintaining eye contact while wearing it. Working in PPE during menstruation exacerbated these discomforts, resulting in struggles to change and dispose of sanitary pads, as well as experiencing abdominal pain. These findings underscore the prominence of MHH issues among FHCWs.

Perceptions and challenges with the wearing of PPE: Findings about the protective effect of the PPE are confirmed by studies among healthcare professionals in Wuhan, China, and California [13,14]. Wearing PPE while caring for COVID-19 patients helps prevent healthcare workers from contracting the virus and reduces the risk of transmission to others, ensuring both their safety and that of their patients. It forms a critical barrier, minimising direct contact with infectious materials and aerosols, contributing to infection control in healthcare settings [13]. The WHO recommendation for PPE wearing is for six hours only [15]. The present study found that FHCWs worked for 6-9 hours of duty; the hours were more compared to a study in China where the health workers worked for 4-6 hours of a shift (Wuhan, China) [13], and to a study done in South India [16]. The extended period of use of PPE, beyond the recommended duration, was attributed both to the manpower crunch as well as the shortage of PPE. Working in the PPE causes distress, as corroborated by other research studies [13]. Headaches due to continual wearing of masks for a longer duration are reported in other studies; people with pre-existing headaches, as described in a review paper, experienced worse symptoms [17-19]. There are also studies about pain, discomfort, headache, facial pain, and earache due to wearing tight-fitting face masks for a prolonged period [19,20].

Profuse sweating while working in PPE is a significant challenge observed, similar to a study in China where one-third of respondents reported severe sweating, resulting in skin irritation, rash, redness, and itching [13]. Another study noted three types of PPE-related skin injuries: device-related pressure injuries, moisture-associated skin damage, and skin tears [21]. The complaints of nausea and headaches by the FHCWs can be due to dehydration as a result of lack of fluid intake. Other side-effects of the loss of sweat can contribute to a decrease in blood volume, leading to low blood pressure and dizziness, as documented on the blog of the Centre for Disease Control and

Prevention (CDC), USA [22]. The finding of an inability to speak and hear in PPEs was not found in any of the studies. Other adverse effects of wearing PPE included difficulty in breathing, nasal bridge scarring, and pain on the back of the ears [13,23]. Comprehensive and effective teaching and training for healthcare professionals, as well as the promotion of a safe and trustworthy work environment, are strategies for reducing the barriers to PPE usage. There have been arguments in favour of national PPE usage standards and programs, but none are currently in place. Healthcare personnel's perceptions of the significance of PPE and their adherence to safety regulations can be improved by education about infection control measures, indications for various types of PPE devices, and proper donning and doffing practices [14].

The participants highlighted difficulties associated with wearing PPE, emphasising the need for comprehensive case-control longitudinal studies to gain a deeper insight into these issues.

Menstrual health of FHCWs: Globally, 70% of the health workforce constituted females in the fight against the COVID-19 pandemic [24]. The study clearly reflects the unmet needs regarding MHH. In the healthcare set-up, they expect time, facilities, and resources to manage menstruation. This is particularly true for frontline health workers using PPE, who have been under stress while working in the pandemic [21,23]. Sweating, suffocation, and discomfort were similarly found in a cross-sectional study in a tertiary care hospital in South India, where FHCWs had to remove the PPE kit due to excessive sweating during menstruation, with experiences of extreme thirst, dehydration, skin rashes, abdominal pain, and headaches. They scored poorly on the work-related Quality of Life Scale [16]. While many factors can cause irregular periods, stress-induced hormonal imbalance is one of the most common causes [25]. There is a paucity of research in this particular area on the aspects of MHH and the use of PPE among FHCWs. This particular finding about irregularity in menses and the experience of premenstrual stress and dysmenorrhoea are significant areas for further research, mostly clinical trials and cause-effect research experiments that would bring scientific evidence about the effect of wearing the PPE and the experience of menstrual symptoms. The challenges of the frequency of visiting the washrooms, changing of sanitary pads, and issues in disposal were found in a podcast where first-hand experiences were shared by clinicians [16,26]. Apart from this, difficulty in access to menstrual products while on duty was also reported as one of the barriers [16,26]. The reasons for these challenges could be due to protocols attached to using the PPE, which refrains individuals from taking quick breaks for other activities [26]. The dehydration, physical isolation, and mental exhaustion while working in the PPE can increase menstrual discomfort; this could be due to the tertiary care hospital's policy of providing only one PPE kit for a duty [26]. In the present study, it was observed that many FHCWs experienced dysmenorrhoea, which could be due to the interrelations of work obligations and the menstrual cycle having a 'domino' effect on the other [27]. However, further research is recommended in this area.

Limitation(s)

A cross-sectional design restricts the scope for assumptions of causality. Cross-sectional studies are valuable for describing the prevalence and associations between variables in a population at a single point in time. However, they are inherently limited in their ability to establish causal relationships due to temporal ambiguity, lack of control, confounding variables, reverse causality, and the absence of longitudinal data. To establish causality, researchers often need to complement cross-sectional studies with other research designs, such as longitudinal studies or experiments that allow for

the manipulation of variables and the observation of changes over time. Only descriptive analyses were conducted. Additionally, a convenience sample was used without the calculation of the sample size, and the study was conducted in only one hospital.

CONCLUSION(S)

The COVID-19 underscores the need for policies supporting FHCWs. Ensuring a steady supply of sanitary products, break time, and proper disposal is crucial. Measures such as medication, shorter shifts, leave options, and improved infrastructure are vital. Providing extra PPE kits during menstruation is essential. It's crucial to ensure that PPE use doesn't hinder practices related to menstrual health for FHCWs. Good menstrual health contributes to gender equality, better health, education, and facilitates productive employment opportunities.

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[ANNEXURE-1]**Interview Schedule**

Date of the interview:

Designation of the participant: Clinician/Nurse/ Allied Healthcare Staff

ID. No:

S. No.	Variable	Response
1.	Age of the respondent	
2.	For how long have you been on duty for COVID-19 patients?	0-5 months >5 months
3.	Which of the body protection suits did you used maximum in last six months?	Surgical scrub pants and top Surgical scrub gown Coverall
4.	Duration of wearing the PPE during the COVID-19 duty	2 to 5 hours 6 to 9 hours 10 to 12 hours
5.	Do you think you are completely protected by PPE while dealing with COVID-19 patients?	Yes No
6.	Does wearing PPE affect your efficiency at workplace?	Yes No
7.	Did you experience any challenges in using the PPE equipment?	Yes No
8.	What type of the challenges did you experience while working in the PPE suit?	Sweating Suffocation Difficulty in speaking, hearing, keeping an eye contact Headache, nausea, earache
Menstruation hygiene management during the COVID-19 duties		
9.	Did you experience your menstrual period while on COVID-19 duty in the last two weeks? (if no skip to Q. No. 15)	Yes No
10.	Did you experience it earlier than the usual date or irregular periods while on duty?	Yes No
11.	If yes, were you prepared for it?	Yes No
12.	Did you had access to sanitary pads?	Yes No
13.	Did you experience premenstrual stress?	Yes No
14.	Did you experience Dysmenorrhoea?	Yes No
15.	Was it difficult to visit the washroom with the PPE suit on?	Yes No
16.	Were you able to change the sanitary pads as required whilst wearing the PPE?	Yes No
17.	Was your PPE suit soiled because of the bleeding?	Yes No
18.	Were you able to dispose the pads at regular intervals?	Yes No
19.	Do you think the hospital is equipped with sufficient WASH facilities for MHM?	Yes No
20.	Were you given some consideration during your menstrual cycle from the regular duties?	Yes No
21.	Do you prefer gender specific PPE?	Yes No
22.	Describe the challenges experienced during the menstrual cycle while wearing PPE on duty	
23.	What suggestions would you like to give to improve the comfort of PPE suits for females?	