# UNIVERSAL COVID-19 TESTING OF WOMEN ADMITTED FOR CHILD BIRTH

**Asma Ansari, Farhat Karim, Rabiya Akbar, Uzma Urooj*, Hafsa Khalil**, Nighat Shafiq**

Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *Pak Emirates Military Hospital/ National University of Medical Sciences (NUMS) Rawalpindi Pakistan, **Armed Forces Institute of Cardiology/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

## ABSTRACT

***Objective:*** To determine the incidence of SARS CoV-2 (COVID-19) infection amongst women admitted for child birth and to categorize patients according to disease severity.

***Study Design:*** Prospective cohort study.

***Place and Duration of Study:*** The study was conducted at Obstetrics Unit of Combined Military Hospital (CMH) Rawalpindi, from 1st May 2020 to 15 June 2020.

***Methodology:*** Pregnant patients reporting for childbirth were initially screened and tested for SARS CoV-2 using RT-PCR kits. Primary outcome was number of positive patients and categorization according to severity of disease into asymptomatic, mild, moderate, severe and critical. Screening parameters were symptoms like fever, cough, flu, myalgia, breathing difficulty, gastrointestinal symptoms, travel history and history of contact. Comparison was done between COVID category of asymptomatic and symptomatic patients.

***Results:*** Based on PCR testing out of the 525 women giving birth during the study period 43 (8.1%) was COVID positive. Out of the total screened patients 484 (92%) were a symptomatic and 41 (7.8%) were screen positive. 20 (48.7%) of screen positive were PCR positive too. According to disease severity 28 (65%) patients were asymptomatic, 10 (23%) mild, 4 (9.3%) moderate and severe (1%). COVID category for screen positive and negative patients was compared and was statistically significant for screen positive patients ($p$<0.0001).

***Conclusion:*** pregnant women with COVID-19 infection are a unique subset of patients. As majority of the patients were asymptomatic and only diagnosed with a positive laboratory test so the recommendation is to do universal testing in this pandemic to prepare for childbirth ina safe environment for patient, neonate and health care workers.

**Keywords:** COVID-19, Pregnancy, Screening, Universal testing.



## INTRODUCTION

The SARS CoV-2 Pandemic has placed tremendous demand on health care systems.Most of the health care staff was unprepared to tackle such an unprecedented situation. Maternity services are no exception. Most of the cases of delivery and cesarean sections cannot be delayed in anticipation of clearance of virus so planning, issuing guidelines and triaging the patients is paramount in preserving hospital resources. Universal testing of all patients admitted for childbirth will help in separating COVID-19 positive patients from normal obstetric patients, thus stream lining care of both the subset of patients[1]. This will preserve the infrastructure and protective equipment to be used only where required thus reducing the burden on resource constrained hospitals. Isolation of affected patients is mandatory and the universal testing policy will help in alignment of hospital infection protocols, bed availability, patient transport, neonatal care and personal protective equipment usage.

Obviously the benefits of universal testing depend on how accurate the results are. The most common and reliable test is a nasopharyngeal swab using reverse transcriptase-polymerase chain reaction (RT-PCR) to identify viral RNA[2]. Center of disease control USA recommends nasopharyngeal swab over any other method and a peer reviewed publication reports sensitivity and specificity of 78.2% and 98.8% for nasopharyngeal RT-PCR. Still the exact sensitivity and specificity is not known as it is a new virus[3]. A

**Correspondence: Dr Asma Ansari,** Department of Obs & Gynae, CMH Rawalpindi Pakistan (*Email: asmaansari31@gmail.com*)
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negative test does not rule out the possibility of infection especially in symptomatic patients where the disease is widespread. Alternatingly a positive test is highly suggestive of infection. So the true prevalence in community might be under reported due to high false negative rates of testing. Large number of obstetric asymptomatic patients reporting for child birth tested positive for SARS COVID-19 in USA thus making a very strong case for universal testing of this unique subset of patients[4]. All obstetric symptomatic patients should be considered patient under investigation (PUI) and laboratory confirmation should be sought before admission. A pregnant patient has multiple interactions with health care providers during the course of pregnancy. Although there have been repeated concerns about these visits and dangers of acquiring infection from hospital these patients need to be provided best care till the time they are admitted for delivery. Identification of COVID status will also streamline the antenatal care of positive patients in designated facilities and also help in modifying their further scheduled antenatal visits through telemedicine. Delivery could be planned as well as neonatal testing and isolation strategies discussed with the patient and family before hand[5]. According to currently available literature and expert advice SARS Cov-2 does not seem to result in poor obstetric outcome. Still provision of safe care to pregnant COVID patients and reduction of onward vertical transmission and spread to health care staff should be the priority in formulating guidelines for management.

Due to the wide spread and aggressive spread of COVID, case arose for universal testing of all women admitted for childbirth beforehand and thus this study was conducted to determine the incidence of viral spread amongst our pregnant patients.

## METHODOLOGY

This study was conducted at Obstetrics and Gynecology department of CMH Rawalpindi from 1st May 2020 to 15 June 2020. After taking informed consent patients were included by consecutive nonprobability sampling technique. Non pregnant patients and those during first trimester were excluded from the study. Institutional review board approval was taken. Pregnant women reporting for childbirth were initially screened before admission by historyand thermal check. Screen positive patients were who had any one of the symptoms of fever, cough, shortness of breath and history of close contact with a confirmed or patient under investigation (PUI) or household contact of a confirmed COVID patient, those engaged in public dealing by occupation, health care workers at points of entry like outpatient departments, emergencies and those involved in care of confirmed COVID patient or PUI, intercity, domestic or international travelling in last 14 days, patients with flu like symptoms, body aches and other nonspecific symptoms like myalgias[6].

Patients were then tested for SARS CoV-2 using RT-PCR kits. They were given the test in outpatient before planned admission. Thus on the basis of results of testing they were kept in non COVID or COVID facility. Those exhibiting symptoms like fever, cough or breathing difficulty were referred to accident and emergency department where they were evaluated in detail by medical specialist and labeled as patient under investigation (PUI). Similarly patients who reported in labor or required immediate admission for obstetric indications were kept in PUI ward before their test results were available. They were treated with full infection protection protocol. Demographic and reproductive profile including, age, occupation, travel history, contact history parity and trimester of pregnancy at diagnosis was noted. The primary outcome was number of positive patients and categorization according to severity of disease into asymptomatic, mild, moderate, severe and critical disease. Asymptomatic patients were nasopharyngeal swab R T-PCR positive for SARS CoV2 but showing no symptoms. Mild disease was categorized by fever, cough, flu like symptoms, myalgia, headache and gastrointestinal symptoms without any laboratory or radiological evidence of disease or

hemodynamic compromise. Moderate disease was oxygen saturation of ≤94%, mild infiltrates on chest x-ray or Persistent high-grade fever for 3 or more days. Severe disease was diagnosed by shortness of breath, blood oxygen saturation ≤93% on room air, lung infiltrates >50% on chest imaging with moderate to severe pneumonia without meeting the criteria for critical disease. Critical disease was defined by respiratory failure, septic shock, or multiple organ dysfunctions with the laboratory evidence of COVID-19 infection[6]. Data was collected and analyzed using SPSS-21. Continous variables were calculated. Categorical variables calculated were occupation, travel and contact history, and category of COVID-19 which were expressed in percentage. Comparison was done between the screen positive patients who tested RT-PCR positive and those who were asymptomatic but were COVID positive and a *p*-value of <0.05 was considered significant for inference.

## RESULTS

Based on PCR testing out of the 525 women giving birth during the study period 43 (8.1%) was COVID positive. Mean age was 30.3 ± 4.8 yrs. Demographic and reproductive data is shown is table-I. Out of the total screened patients 484 (92%) were asymptomatic, 38 (7.3%) flu like symptoms, 36 (6.9%) had myalgia, 33 (6.3%) were identified by pyrexia, cough 33 (6.3%), breathing difficulty 11 (2.1%) and gastrointestinal symptoms 7 (1.3%). Many of the patients were identified by more than one screening parameter. Mean temperature of patients at screening was 98.8 ± 0.24 a minimum of 98 and maximum of 101 degree F. Of total admittedpatients 41 (7.8%) were screen positive and 20 of these (48.7%) had a positive PCR test. Rest of 23 (4.7%) patients was detected by universal testing of patients admitted for childbirth. According to disease severity 28 (65%) of COVID positive patients were asymptomatic and 15 (34.8%) were symptomatic. COVID categories are shown in fig-1. There were no critical patients nor were there any maternal deaths. Out of the RT-PCR positive patients 3 (6%) were negative on initial testing but due to symptoms were tested again and were positive on second day of admission. COVID category for screen positive and negative patients was compared and was statistically significant for screen positive patients ($p$<0.0001) (table-II).

**Table-I: Demographic and reproductive data.**

| Variables (n=525) | Frequency (n) | Percentage (%) |
|---|---|---|
| **Parity** | | |
| 0 | 45 | 8.6 |
| 1 | 193 | 36.7 |
| 2 | 189 | 36.1 |
| 3 | 76 | 14.5 |
| 4 | 18 | 3.4 |
| 5 | 4 | 0.8 |
| **Occupation** | | |
| House wife | 488 | 92.9 |
| Health worker | 20 | 3.8 |
| Teacher | 04 | 0.7 |
| Other | 13 | 2.4 |
| **Travel Hx** | | |
| Intercity | 61 | 11.6 |
| International | 04 | 0.8 |
| No Travel Hx | 460 | 87.8 |
| **Contact** | | |
| Family | 91 | 17.4 |
| Workplace | 17 | 3.2 |
| Nil | 416 | 79.4 |
| **Trimester** | | |
| Second | 13 | 2.5 |
| Third | 512 | 97.5 |

**Table-II: Comparison of screening and RT-PCR testing.**

| Variables | Screen Positive | | *p*-value |
|---|---|---|---|
| | Negative | Positive | |
| **COVID Category** | | | |
| Asymptomatic | 23 | 5 | <0.0001 |
| Mild | - | 10 | |
| Moderate | - | 4 | |
| Severe | - | 1 | |
| NA | 460 | 21 | |
| **RT PCR** | | | |
| Negative | 458 | 21 | <0.0001 |
| Positive | 23 | 20 | |

## DISCUSSION

According to world health organization viral illnesses will continue to resurface and cause serious public health challenges. We will come across situations requiring triage, improving

our operational capacity, safe guarding ourselves and staff, setting quarantines and controlling the spread of infection. Early screening and rapid testing to facilitate response time remains the key to managing symptomatic and asymptomatic

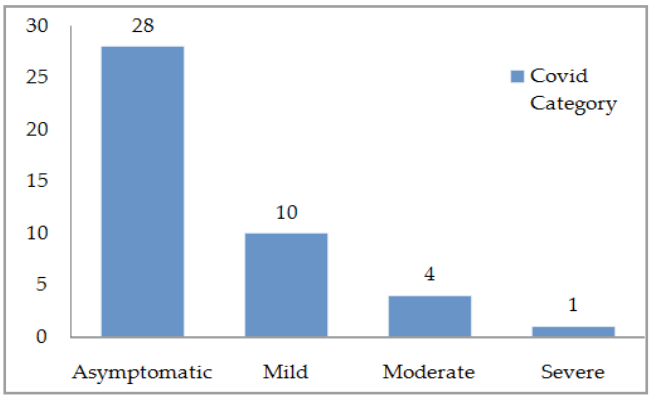


**Figure: COVID categories.**

patients as well as our own resources. Knowledge and clinical experience with COVID-19 is in the phase of evolution. Screening and testing has implications for all the stake holders including health workers, administrators, patient, newborn and family thus making a case for judicious and evidence based use of resources. As majority of the patients were in reproductive age group mean age was 30.3 ± 4.8 yrs which is similar to results of other studies done on pregnant patients with COVID infection, 30 years and 33 ± 5.8[7,8]. Amongst the study population 8.6% were primigravida and 72% were P1 and P2 which is comparable to a study published in Lancet where mean parity was P2 ± 2.9 By occupation 92.9% were house wives, 3.8% health care workers including doctors, nurses and paramedical staff, 2.4% other office jobs and 0.7% teachers. This shows that virus was widely spread in community and no one was exempted, even those staying at home. In our study 97.5% were in third trimester and 2.5% in second trimester. This was in agreement to another study where median gestational age on admission was 38 +0 (interquartile range, 36+039+1) weeks[10]. The world is still in the midst of a rapidly evolving outbreak. To start with travel restrictions and isolation policies for passengers were put in place and history of travel especially from high prevalence areas was included as a significant risk factor which isevident in some studies[11]. With each passing day recommendations are changing but we included travel history in our screening parameters and noted that 87% patients had no history of travel, 11.6% intercity and only 0.8% international travel. This epidemiological parameter suggests that after community spread in a country travel history might become irrelevant.

Out of total admitted patients 7.8% were screen positive and 48.7% of screen positive had a positive PCR test. 92% of the patients were screen negative or asymptomatic and 4.7% of these patients were COVID positive. On PCR testing out of women giving birth during the study period 8.1% were COVID positive. A study done in USA new York at the peak of epidemic on 215 pregnant patients reported that 1.9% were screen positive and 100% of these tested positive for SARS-CoV-2 whereas 13.7% of asymptomatic patients were found positive[4]. Another multicenter study in Boston found a prevalence of COVID-19 in symptomatic obstetric patients as 7.9% and in asymptomatic patients it was 1.5%. Over a nearly three week duration 99.2% of 763 patients were tested and 45% of the patients admitted were asymptomatic at presentation[12]. In another study by Campbell *et al* in Connecticut 782 pregnant women were tested and 3.9% tested positive but 73.3% were asymptomatic[13]. This shows a higher incidence of infection in our population especially in asymptomatic patients, indicating widespread infection and a strong case for testing all pregnant women. Out of the total screened patients 92% were asymptomatic, 7.3% flu like symptoms, 6.9% had myalgia, fever and cough 6.3% each, breathing difficulty 1.8% and gastrointestinal symptoms 1.3%. The most common symptoms in a study by Yan *et al* were fever 50.9% and cough 28.4%. Almost 23.3% patients were asymptomatic[14]. In another study of 24 cases in Nanjing province China the typical symptoms of fever, cough and fatigue were seen in 20.8% patients. Lymphopenia and leukopenia were not seen in asymptomatic patients and no

patient developed severe pneumonia[15]. Ours was a much bigger sample size but symptom frequency was low and non-specific symptoms like flu and myalgia were more common. There was minimal abnormal laboratory or radiological findings.

Initially in USA, testing was only performed for individuals if a positive result was to change management and those who were at risk of poor outcome,such as the immunosuppressed, elderly or the health care workers[16]. Later on the recommendation to test all pregnant women was proposed and this was followed in our study. This is in accordance to The World Health Organization directive which recommends rapid diagnosis, isolation of cases, and contact tracing so that precautions and self-isolation of the staff and close contacts can be carried out. Keeping in view the South Korean model, a similar policy was followed by Switzerland of testing to know the extent and then curtail the disease[17]. The same contact tracing policy was adapted in Pakistan. Pregnant patients were included in government of Pakistan guidelines as special population requiring early testing and categorization[6]. In our study, all patients were screened and then tested irrespective of their symptomatology. According to disease categorization 65% of COVID-19 pregnant patients were asymptomatic, whereas 23% were categorized as mild, 9.3% moderate % and 2.3% severe respectively. In a study by Breslin *et al* 85% had mild disease, 10% severe and 5% critical[18]. This is comparable toa study in China conducted on 118 patients where the results were similar as 92% had mild disease followed by severe 7% and 1% critical disease[19]. In a Hubei province of china, 9 pregnant ladies with COVID-19 were studied. Eight out of these nine patients tested positive and had changes on CT scan chest[20]. A World Health Organization commission's report on China during February 2020 noted that only 8% of women had severe disease and 1% were critical. They also concluded that pregnant women were not at an unusually higher risk for developing adverse complication due to COVID-19. We have also noted a similar outcome[21]. Based on these findings it was evident that during the pandemic most of COVID-19 positive patients admitted for delivery were asymptomatic. There were no severe or critical patients nor were there any maternal deaths. It is probably a little early in time to make conclusions about the long term consequences of this virus on wellbeing of mothers and infants. As it is a novel virus which is just seven months old so time will tell how seriously COVID-19 will affect infected mothers and their babies[22].

Even though RT-PCR has its limitations as it can miss patients who have recovered and at times it may fail to detect an infected patient[23]. Inspite of the limitations it helps us in our struggle against the impact of the virus by identifying and isolating the infected, tracing and quarantine contacts[24]. In pregnant patients this will further help in making a safe delivery plan and isolation strategies. Out of screen positive patients only 48.7% had a positive PCR test. Rest of the 4.7% patients was detected by universal testing of asymptomatic patients for childbirth. Studies have demonstrated that RT-PCR may be initially negative in spite of symptoms like in our study 6% of the patients initially tested negative. Similarly in a study by Wu *et al* 11.3% patients had two negative tests before becoming positive[24]. Another study reported that out of 29 asymptomatic patients fever developed later on in 10% of patients 3 days after admission[25]. Main contribution of this study is demonstrating the need for testing all pregnant patients considering the spread of infection, novelty of virus, wide spectrum of presentation and vulnerability of pregnant population and fetuses. Limitation is that it is a single center hospital based study which might not be a true reflection of actual spread and its consequences.

## CONCLUSION

Pregnant women with COVID-19 infection are a unique subset of patients. Majority of the patients in this study were asymptomatic and only diagnosed with a positive laboratory test. There are at present no effective drugs or preven-

tive vaccines available so the recommendation is to do a universal testing for SARS-CoV-2 in this pandemic to prepare for childbirth in a safe environment for patient, neonate and health care workers. Identification by testing, patient isolation and staff preparedness is the key point in provision of best health care environment.

## CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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