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Universal COVID-19 Testing Among Hospitalized Pregnant Women during the Initial COVID-19 Period in Thailand

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ABSTRACT

OBJECTIVE To determine the prevalence of COVID-19 infection among hospitalized pregnant women during the initial COVID-19 period in Thailand.

METHODS Before admission, symptoms and risks of COVID-19 infection of pregnant women were assessed by using a self-administered questionnaire. Nasopharyngeal and oropharyngeal swab tests were collected by trained obstetrics and gynecology residents and analyzed using the real-time fluorescence reverse transcription-polymerase chain reaction technique (RT-PCR). Electronic medical records of the patients were extracted for this study.

RESULTS Among 570 women admitted to the Department of Obstetrics and Gynecology, King Chulalongkorn Memorial Hospital from April 16 to June 6, 2020, most (99.6%, 568/570) had a negative COVID-19 test. Results of the other two women (0.4%, 2/570) were missing. Eleven women (1.9%, 11/570) had traveled to or from COVID-19 endemic regions. Thirteen women (2.3%, 13/570) were healthcare personnel. None of the women reported signs or symptoms of COVID-19 infection at admission. Their maternal and neonatal outcomes were comparable to the pre-COVID-19 period, i.e., the incidence of preterm delivery was 27.4% (156/570), and the cesarean section rate was 51.1% (271/530). Eighteen newborns (3.2%, 18/567) had 5-minute Apgar scores of less than 7. Twenty-four (4.2%, 24/567) newborns required neonatal intensive care due to very low or extremely low birth weight, low Apgar scores, or multiple fetal anomalies.

CONCLUSIONS Pre-admission universal testing for COVID-19 infection in asymptomatic pregnant women with a history of low risk for COVID-19 infection during the low prevalence period in Thailand showed negative results. Consideration of implementing universal testing should be adapted to based on the epidemiological situation.

KEYWORDS asymptomatic, COVID-19, pregnancy, SAR-COV-2, screening

INTRODUCTION

In December 2019, the novel coronavirus 2019 (2019-nCoV) outbreak emerged in Wuhan, China and had begun to spread rapidly across the globe by the beginning of 2020. The World Health Organization (WHO) declared the novel coronavirus 2019 a global pandemic on 11 March

2020 (1). The novel coronavirus was named SARS-CoV-2 or COVID-19, and is an enveloped RNA virus (2). The virus attaches to the angiotensin-converting enzyme 2 (ACE2) receptor in the respiratory tract causing symptoms of fever, dry cough and shortness of breath (3,4). In severe cases, pneumonia, respiratory distress syndrome and septic shock can develop. However, one-fifth of patients show no symptoms at the time of hospital admission (5). The primary diagnostic testing method for COVID-19 is nucleic acid detection using real-time fluorescence reverse transcription-polymerase chain reaction (RT-PCR) with biological specimens such as nasal or throat swab or feces (6).

The first COVID-19 case in Thailand was reported on 12 January 2020. The number of infected cases rapidly increased from 42 on March 1 to 3,081 by the end of May 2020 (7). In order to control the disease, the Thai government imposed an emergency decree that consisted of numerous regulations including the closure of many public areas where people congregate.

King Chulalongkorn Memorial Hospital, a tertiary referral hospital in Bangkok, established a special COVID-19 unit which implemented patient care protocols to minimize the risk of infection among both patients and healthcare workers. Before admission, all patients were evaluated for their risk of COVID-19 infection and assessed for symptoms of COVID-19. RT-PCR testing of all at-risk patients using nasopharynx and oropharynx swabs began in March 2020.

Physiologic changes in respiratory, cardiovascular and immune systems make pregnant women more susceptible to severe COVID-19 symptoms. Higher adverse perinatal outcomes have been reported in COVID-19-infected mothers including preterm birth, preeclampsia and fetal intrauterine growth restriction (8,9). Risk of postoperative venous thromboembolism has also been reported to increase in infected cases (10). However, the clinical manifestations in pregnant women are similar to non-pregnant women and the evidence of vertical transmission from mother to fetus is still limited (11,12). The US Centers for Disease Control and Prevention (CDC) recommends COVID-19 testing in both symptomatic and asymptomatic patients if there has been contact with COVID-19 cases (13). In asymptomatic pregnant women who are at low risk of infection, COVID-19 testing is not recommended as routine practice. However, in high prevalence countries, there have been reports of positive COVID-19 test results in asymptomatic pregnant women. In New York City at the height of the early COVID transmission in April 2020, a clinical review found 13.5% of asymptomatic pregnant women tested positive for COVID-19 (14). A study in California, a state with a much lower COVID rate than New York City, showed only 0.43% of patients with a positive COVID-19 test were asymptomatic at the time of admission (15).

The Royal Thai College of Obstetricians and Gynecologists (RTCOG) is responsible for ensuring that clinical practice guidelines for management of COVID-19 infection in pregnancy are followed. The guidelines define individuals requiring COVID-19 testing as those having a fever with one of the following symptoms: cough, runny nose, sore throat, or shortness of breath (16).

This study was conducted to determine the prevalence of COVID-19 infection during the initial COVID-19 period among hospitalized pregnant women at a tertiary hospital in Bangkok, Thailand. In addition, we reported maternal and neonatal outcomes among this cohort of pregnant women.

METHODS

This is descriptive study. After obtaining approval from the Institutional Review Board of Chulalongkorn University, we enrolled all pregnant women at 22 weeks or more of gestation admitted to the Department of Obstetrics and Gynecology, King Chulalongkorn Memorial Hospital, Bangkok, Thailand, from April 16 to June 6, 2020. The multi-step pre-admission COVID-19 screening process was performed by residents trained in obstetrics and gynecology. All residents were coached on how to collect nasopharynx and oropharynx swabs by an emerging infectious diseases team. A questionnaire covering self-reports of symptoms in the 5 days prior to admission and risk exposure to COVID-19 infection within 1 month pri-

or to admission were administered to all newly admitted patients. The risk of COVID-19 infection was assessed based on potential exposure in various settings including contact with an infected person, frequent stays in crowded areas, travel from countries with a high prevalence of COVID-19, and working in a healthcare setting. Reports of any suggested COVID-19 symptoms including cough, runny nose, sore throat, anosmia and shortness of breath were recorded. The temperature of each woman was measured. Nasopharynx and oropharynx swabs were then collected in a negative pressure room. The RT-PCR for COVID-19 was processed by the Chulalongkorn microbiology laboratory using the Cobas® SARS-COV-2 test (Roche Diagnostics, Indianapolis, IN, USA). RT-PCR test results were interpreted as either positive or negative.

Data on patients were retrieved from electronic medical records including age, pre-pregnancy body mass index, ethnicity, gravidas (1 or ≥ 2), parity (nulliparous or multiparous), gestational age, medical diseases and pregnancy risks, mode of delivery, intrapartum complications, postpartum complications, duration of hospital stay and neonatal outcomes.

Categorical variables are reported as frequencies and percentages. Continuous variables are presented as means and standard deviations (SD) or medians and interquartile ranges (IQR). Statistical analyses were conducted using IBM SPSS Statistics software, version 22.0 (IBM Corp., Armonk, NY, USA).

RESULTS

A total of 570 pregnant women hospitalized during the study period were enrolled. Baseline characteristics are shown in Table 1. Almost all (95.0%) were Thai. The mean (SD.) age was 31.4 (5.5) years. The mean (SD.) gestational age at the date of admission was 37.6 (2.6) weeks. Six of the patients had a history of cardiovascular diseases, including three prior cardiovascular accidents, two arrhythmias and one dilated cardiomyopathy. There were 145/570 (25.4%) patients diagnosed with anemia, including 102/570 (17.9%) with the thalassemia trait, 33/570 (5.8%) with iron deficiency anemia, and 9/570 (1.6%) with thalassemia disease. One patient had systemic lupus erythematosus with autoimmune hemolytic anemia.

Table 1. Baseline characteristics of hospitalized pregnant women (N=570)

	N (%)
Maternal age	
< 35 years	393 (68.9)
≥ 35 years	177 (31.1)
Pre-pregnancy BMI (kg/m^2)	
Underweight (less than 18.5)	76 (13.3)
Normal weight (18.5-24.9)	342 (60.0)
Overweight (25-30)	92 (16.1)
Obese (greater than 30)	47 (8.3)
Missing	13 (2.3)
Ethnicity	
Thai	540 (94.7)
Lao	10 (1.8)
Burmese	8 (1.4)
Cambodian	3 (0.5)
Unidentified	5 (0.9)
Other[a]	4 (0.7)
Gravidities	
1	252 (44.2)
≥ 2	317 (55.6)
Missing	1 (0.2)
Parity	
Nulliparous	308 (54.0)
Multiparous	261 (45.8)
Missing	1 (0.2)
Maternal comorbidities	
Gestational diabetes	37 (6.5)
Pregnancy induced hypertension	41 (7.3)
Asthma	6 (1.1)
Cardiovascular disease	6 (1.1)
Anemia	144 (25.3)

[a]Filipino, Guinean, Malin, Pakistani

Table 2. Risk of COVID-19 infection of hospitalized pregnant women (N=570)

	N (%)
Risk-based screening	
Recent travel from COVID-19 endemic regions	11 (1.9)
Contact with known infected persons	0
Healthcare providers	13 (2.3)
Symptom-based screening	
Fever (BT > 37.5 °C)	0
Cough	3 (0.5)
Nasal symptoms	0
Sore throat	2 (0.4)
Anosmia	0
Shortness of breath	0

The risk of COVID-19 infection 1 month prior to admission and symptoms of COVID-19 infection 5 days prior to admission are displayed in Table 2. All patients were afebrile, including 13/570 (2.3%) patients who were healthcare

Table 3. Maternal outcomes (N=530)

Maternal outcomes	N (%)
Mode of delivery	
Spontaneous vertex delivery	250 (47.2)
Operative vaginal delivery	9 (1.7)
Elective cesarean delivery	124 (23.4)
Emergency cesarean delivery	147 (27.7)
Gestational age at delivery	
< 37 weeks, n (%)	119 (22.5)
≥ 37 weeks, n (%)	411 (77.5)
Postpartum complications	
None	491 (92.6)
Postpartum hemorrhage (EBL > 1,000 mL)	11 (2.1)
Wound infection	6 (1.1)
Breast complications	1 (0.2)
Others[a]	3 (0.6)
Missing	18 (3.4)

[a]Fourth-degree perineal tear, wound separation, heart failure

Table 4. Neonatal outcome (N=567)[a]

Neonatal outcome	N (%)
Birthweight, n (%)	
Normal birthweight (≥ 2,500 g)	463 (81.6)
Low birthweight (< 2,500 g)	85 (15.0)
Very low birthweight (< 1,500 g)	13 (2.3)
Extremely low birthweight (< 1,000 g)	6 (1.1)
Apgar scores at 1 min, mean (SD.)	8.7 (1.2)
Apgar scores at 5 min, mean (SD.)	9.8 (1.0)

[a]496 were singleton neonates, 62 were twin neonates, and 9 were triple neonates.

providers. RT-PCR tests were interpreted as negative in 568/570 (99.6%) patients with the results of 2/570 (0.4%) patients missing.

Maternal outcomes are shown in Table 3. Six patients had intrapartum fever without specific causes which resolved after delivery. One patient had a prolonged rupture of membranes and developed chorioamnionitis. Non-reassuring fetal heart rate was detected in 14/530 (2.6%) patients. The median (interquartile range) duration of hospital stay was 4 (3-5) days. None of the women developed signs or symptoms of COVID-19 infection during admission and 40/570 (7.0%) patients were undelivered. Among those who delivered (93.0%, 530/570), 496 were singleton neonates, 62 were twin neonates, and 9 were triple neonates. Mean (SD.) gestational age at delivery was 37.8 (2.3) weeks with a mean (SD.) birthweight of 2,897.0 (587.8) grams. Eighteen (18/567, 3.2%) newborns had 5-minute Apgar scores of less than 7. Twenty-four (24/567, 4.2%) newborns required neonatal intensive care, including 5 preterm births with low birthweight and low Apgar scores. There were 11 with very low birth weight, 5 with extremely low birth weight and 3 with multiple fetal anomalies (Table 4).

DISCUSSION

Universal testing of COVID-19 infection found negative results in all asymptomatic pregnant women and there were no reports of COVID-19 related symptoms during admission. These results mirror the very low prevalence of COVID-19 infection during the initial infection period in Thailand (1 in 23,000) and help explain the differences from studies in other countries. The prevalence of COVID-19 infection in asymptomatic pregnant women was reported as 13.7% in New York City (14), 3.3% in London (17), 0.5% in Madrid (18) and 0.43% in California (15). Differential prevalence of COVID-19 infection in each country might be a plausible cause. In Thailand, a total of 2,672 confirmed cases of COVID-19 infection had been recorded by April 16, 2020 when the universal testing protocol began. The total increased to 3,104 cases by the end of the study period on 6 June 2020 (7). On July 28, 2020, the Global COVID-19 Index (GCI) ranked Thailand as first in the Global COVID-19 recovery index with an index score of 82.06 (19).

The policy of King Chulalongkorn Memorial Hospital during the early phase of the outbreak period aimed to reduce the number of routine antenatal visits to limit potential exposure risk. Additionally, the universal RT-PCR test was applied to all pregnant women who required hospitalization. None of the pregnant women in this study had a positive screening test result for COVID-19. All pregnant women were afebrile prior to admission, with cough and sore throat only presenting in 3 (0.5%) and 2 (0.4%) women, respectively. Our study findings support previous CDC recommendations that COVID-19 testing should not be performed routinely (13). According to the RTCOG guidelines, testing for COVID-19 was suggested only for women who have fever with one of the following symptoms: cough, runny nose, sore throat, shortness

of breath, or a diagnosis of pneumonia. Differences in screening protocols might be necessary among countries due to differences in prevalence of the disease.

The incidence of preterm delivery (27.4%), cesarean section (51.1%) and NICU admission (4.2%) are comparable to the pre-COVID period figures of 28.7% (20), 51.6% (21) and 5.7% (22), respectively. This study represents a large cohort involving universal testing for COVID-19 infection among pregnant women in Thailand. While testing by the standard RT-PCR technique can yield false negative rates in asymptomatic patients (23), this study found no patients developed symptoms related to COVID-19 infection during the postpartum period.

CONCLUSIONS

Pre-admission universal testing for COVID-19 infection in asymptomatic pregnant women with a history of low risk for COVID-19 infection during a low prevalence period like the initial phase of COVID-19 in Thailand showed negative results. However, the result of our study might not be applicable in high prevalence settings such as the current COVID situation in Thailand. Consideration of implementation of universal testing should be based on the epidemiological situation.

STRENGTH

Nasopharynx and oropharynx swab tests were collected by well-trained residents and evaluated using reliable assays for qualitative detection of COVID-19 (24).

LIMITATION

During the initial pandemic, diarrhea and nausea were considered to be atypical COVID-19 symptoms (25). The hospital protocol did not include those symptoms in symptom-based screening for risk of COVID-19 infection. The data was collected for only a short period of time. For further information, the longer period is needed.

DATA AVAILABILITY

All data generated and analyzed during this study are included in this published article.

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The authors received no funding support for this research or for publication.

CONFLICT OF INTERESTS

The authors declare no conflicts of interest regarding the publication of this paper.

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