

Investigation of SARS-CoV-2 RNA in Human Milk of 3 Mothers with SARS-CoV-2

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Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a extremely infectious disease, and the current outbreak has been declared by WHO as a global public health threatening. Researches have showed that transmission of SARS-CoV-2 is mainly from person to person via airborne droplets. It is unclear whether SARS-CoV-2 can be shed into human milk and transmitted to a child via breastfeeding. Here we investigated SARS-CoV-2 RNA in breast-milk samples of three mothers with SARS-CoV-2 and their infant. The human milk sample of one mother for SARS-CoV-2 RNA was positive. By contrast, SARS-CoV-2 RNA was not detected in human milk of two mothers. The throat swab sample was also positive in the infant of the mother whose SARS-CoV-2 RNA was detected in human milk. By contrast, throat swab of others infants was negative. Because the mother with SARS-CoV-2 RNA detected in human milk sample is not breastfeeding, the risk of contagion from the infant to the mother is eliminated. To date, in the literature, the presence of SARS-CoV-2 RNA has only been detected in the breast milk of two mothers with SARS-CoV-2. To the best of our knowledge, our case is third case with SARS-CoV-2 RNA detected in human milk. On the other hand, this is first case with SARS-CoV-2 RNA detected in human milk of mother who does not breastfeed her infant. The existing data indicates that SARS-CoV-2 can be rare transmitted through human milk.

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Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a extremely infectious disease, and the current outbreak has been declared by WHO as a global public health threatening. Researches have showed that transmission of SARS-CoV-2 is mainly from person to person via airborne droplets. It is unclear whether SARS-CoV-2 can be shed into human milk and transmitted to a child via breastfeeding. Here we investigated SARS-CoV-2 RNA in breast-milk samples of three mothers with SARS-CoV-2 and their infant. The human milk sample of one mother for SARS-CoV-2 RNA was positive. By contrast, SARS-CoV-2 RNA was not detected in human milk of two mothers. The throat swab sample was also positive in the infant

of the mother whose SARS-CoV-2 RNA was detected in human milk. By contrast, throat swab of others infants was negative. Because the mother with SARS-CoV-2 RNA detected in human milk sample is not breastfeeding, the risk of contagion from the infant to the mother is eliminated. To date, in the literature, the presence of SARS-CoV-2 RNA has only been detected in the breast milk of two mothers with SARS-CoV-2. To the best of our knowledge, our case is third case with SARS-CoV-2 RNA detected in human milk. On the other hand, this is first case with SARS-CoV-2 RNA detected in human milk of mother who does not breastfeed her infant. The existing data indicates that SARS-CoV-2 can be rare transmitted through human milk.

Keywords: Human milk; infant; SARS-CoV-2

What's already known about this topic?

It is unclear whether SARS-CoV-2 can be shed into human milk and transmitted to a child via breastfeeding. To date, in the literature, the presence of SARS-CoV-2 RNA has only been detected in the breast milk of two mothers with SARS-CoV-2. In two cases, environmental contamination or retrograde flow from an infected infant could not be ruled out.

What does this article add?

Because the mother with SARS-CoV-2 RNA detected in human milk sample is not breastfeeding, the risk of contagion from the infant to the mother is eliminated. This is first case with SARS-CoV-2 RNA detected in human milk of mother who does not breastfeed her infant.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a extremely infectious disease, and the current outbreak has been declared by WHO as a global public health threatening. Researches have showed that transmission of SARS-CoV-2 is mainly from person to person via airborne droplets.^{1,2} However, it can be through skin contact, faecal-oral transmission, and ocular surface contact.³⁻⁵ Gold standard diagnostic method of SARS-CoV-2 is the virus to be detected in nasopharyngeal swabs by a reverse transcription real-time PCR (RT-qPCR).^{1,2} The virus also can be detected in bronchoalveolar-lavage fluid, sputum, saliva, faces, and urine.^{6,7} It is unclear whether SARS-CoV-2 can be shed into human milk and transmitted to a child via breastfeeding.

Here we investigated SARS-CoV-2 RNA in breast-milk samples of three mothers with SARS-CoV-2 and their infants. All mothers were informed about the study and gave informed consent. Necessary permission was obtained from the health authority of our country (Republic of Turkey Ministry of Health).

All mothers lives in the east of Turkey. At different times they were admitted to our hospital. For the mothers, computed tomography (CT) scan was not shown any abnormal finding. CT scans were not performed to infants.

The mother 1 with 22-day newborn (infant 1) is a 24-year-old woman. She had brought a healthy baby through normal vaginal delivery. The newborn and mother did not have any health problems during and after delivery. She brought the infant to the emergency room due to high fever (38,3°C). The infant's throat swab was positive for SARS-CoV-2. The mother has sore throat, fatigue, and light cough, with a body temperature of 36.6 °C. Blood tests of the mother revealed normal. Her vital signs were stable with oxygen saturation of 97% in room air. Her chest CT scan don't showed any abnormal findings. Because the infant's throat swab was positive for SARS-CoV-2, the test was also applied to the mother too. Also, her throat swab was positive. The mother 1 and her infant were isolated in the same room of the hospital. The mother 1 was evaluated as SARS-CoV-2 and received hydroxychloroquine (2x400mg [first day], 2x200 mg for 4 days [oral,5days in total]), azithromycin (1x500mg [first day] ,1x250 mg for 4 days [oral,5 days in total]),and Enoksaparin sodyum (2x 0,6ml,sc) according to the interim national guide. On the 5th day of hospitalization, throat swab sample of mother and baby for SARS-CoV-2 were negative. On the 6th day of hospitalization, breast milk was collected with pumps and sterod into a sterile container. On the same day, it was detected SARS-CoV-2 RNA in milk sample from mother 1. Because the nipple was sticky, the mother could not breastfeeding. Because the mother is not breastfeeding, the risk of contagion from the

infant to the mother is eliminated. The mother 1 and her infant were discharged as healthy on the 7th day of hospitalization. Moreover, the mother 1 was reexamined 14 days after discharge, and no viral RNA was detected in her breastmilk.

The mother 2 with 36-day infant (infant 2) is a 26-year-old woman. She had given birth with cesarean section. The newborn was healthy. She has a history of bipolar disorder for 6 years and has been treated with oral drugs. She did not use medicines for bipolar disorder during pregnancy. She had breastfed her newborn for 4 weeks after birth. She had used drug (Lithuril, Quetiapine, Haloperidol dekanolat) for bipolar disorder. She was not breastfeeding for the past week because of using drugs. She was admitted to the emergency room due to her psychiatric complaints on the 36th postpartum. Because of cough and sore throat, the throat swab sample for SARS-CoV-2 RNA was positive. By contrast, throat swab of infant 2 was negative. Chest CT scan and all laboratory parameters(cbc,crp,etc) were normal. Other findings of both mother 2 and infant 2 are shown in table 1. She was discharged as healthy on the 6th day of hospitalization.

The mother 3 with 120-day infant (infant 3) is a 26-year-old woman. She had brought a healthy baby through normal vaginal delivery. The mother 3 and her infant did not have any health problems during and after delivery. She was breastfeeding. She was admitted to the emergency room due to her complaints (sore throat, cough). Chest CT scan and all laboratory parameters(cbc,crp,etc) were normal. Her throat swab sampled for SARS-CoV-2 was positive. Throat swab of infant 3 was negative. Other findings of both mother 3 and infant 3 are shown in table 1. During the 14-day isolation, the mother 3 breastfed her infant by wearing a surgical mask. During this period, no health problems developed in the infant 3. After the 14-day isolation, the throat swab of both mother 3 and infant 3 for SARS-CoV-2 were negative.

For breast milk collection, iodine was used to disinfect all patient's breast. Breast milk was collected with pumps and stored into a sterile container. On the day of taking the samples, SARS-CoV-2 RNA was examined in all breast milk samples. Following admission, two breast milk samples from Mother 2 and 3 tested negative. By contrast, SARS-CoV-2 RNA was detected in milk from mother 1. Additionally, throat swabs of infant 1 was positive. All test results of the SARS-CoV-2 RNA for mothers and infants were shown in table 1.

All throat swab and breast milk samples were evaluated in our center microbiology laboratory and by the same expert team. The presence of SARS-CoV-2 RNA in the breast milk of the patient was investigated with a reverse transcription real-time PCR (RT-qPCR) method with Bio-Speedy RT-qPCR kit (Bioeksan R&D Technologies Ltd., Turkey) targeting the RNA-dependent RNA polymerase (RdRp) gene of the virus. The viral RNA was extracted with Bio-Speedy vNAT kit (Bioeksan R & D Technologies Ltd., Turkey) and amplification was performed in Rotor-Gene Q 5plex HRM device (Qiagen, Belgium).

Human milk has numerous advantages for newborns, containing inactive transmission of antibodies against several microbial diseases.⁸ To date, in the literature, the presence of SARS-CoV-2 RNA has only been detected in the breast milk of two mothers with SARS-CoV-2. One of these cases was reported by *Groß Ret al.* in the lancet.⁹ The RT-qPCR for SARS-CoV-2 was positive in the swab of this mother's newborn. Because this mother was breastfeeding her newborn, the virus could be contaminated to the breast through the secretions of the newborn. The other case was reported by *Wu Y et al.*¹⁰ The RT-qPCR for SARS-CoV-2 was not done in the swab of this mother's newborn.¹⁰ While RT-qPCR was positive in human milk of one (mother 1) of our cases, it was found negative in the others (mother 2 and 3). RT-qPCR of SARS-CoV-2 was positive in swabs of infant 1. Other mothers except the mother 1 were breastfeeding until the diagnosis of SARS-CoV-2. Also, during the 14-day isolation, the mother 3 breastfed her infant by wearing a surgical mask. During this period, no health problems developed in the infant 3. After the 14-day isolation, the throat swab of both mother 3 and infant 3 for SARS-CoV-2 were negative.

To the best of our knowledge, this (mother 1) is third case with SARS-CoV-2 RNA detected in human milk. On the other hand, this is first case with SARS-CoV-2 RNA detected in human milk of mother who does not breastfeed her infant (infant 1).

In a study by *Liu W et al.*, ten breast milk samples from mothers were obtained after their first lactation and

tested for SARS-CoV-2 RT-qPCR with negative results.¹¹ In our study, in one of the 5 milk samples taken from the mothers, RT-q PCR for SARS-CoV-2 was positive. The existing data indicates that SARS-CoV-2 can be rare transmitted through breastmilk.

As in the example of mother 3 in our study, we think that the benefits of breastfeeding may outweigh the risk of SARS-CoV-2 infection in infants. In our cases, the mother 3 breastfeed her infant and SARS-CoV-2 was not transmitted from mother to infant during the mother's illness. Therefore, as recommended by the world health organization¹², we recommend that mothers with SARS-CoV-2 breastfeed their infants on condition that they wear a surgical mask. Also, more studies are needed on whether SARS-CoV-2 is excreted in breast milk and whether it is transmitted to the infant through breast milk.

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Table I: Clinical Characteristics of the Mothers with SARS-CoV-2 Confirmed by RT-PCR and Their Infants

	Mother 1	Infant 1	Mother 2	Infant 2	Mother 3	Infant 3
Age	24 y	22 d	26 y	36 d	26y	120 d
Signs of infection	Sore throat, fatigue, light cough	Fever	Cough, fatigue	No	sore throat, cough	No
Coexisting conditions	No	No	Bipolar disorder	No	No	No
CT scan test finding	No	ND	No	ND	ND	ND
Contact with patients	No		Yes		Yes	
Throat swab RT-qPCR	Pozitif	Pozitif	Pozitif	Negatif ^a	Pozitif	Negatif ^a
Human milk RT-qPCR	Pozitif		Negatif ^a		Negatif ^a	
Mother–infant contact						
Immediate separation	No No	No	Yes No	Yes	No Yes	No
Breastfeeding						
Mode of delivery	vaginal		Caesarean		Vaginal	
Hospital stay days	7	7	6	Not hospitalized	Not hospitalized	Not hospitalized
Any severe complications	No	No	No	No	No	No
Treatment						
Supportive treatment	Yes	Yes	Yes	No	Yes	No
Hydroxychloroquine	Yes	No	Yes	No	No	No
Azithromycin	Yes	No	Yes	No	No	No
Antiviral agent	No	No	No	No	No	No
Intensive care unit	No	No	No	No	No	No
Mechanical ventilation	No	No	No	No	No	No

ND: Not done. ^a Two RT-qPCR specimens examined at 24-hour intervals are negative.

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