

ORIGINAL ARTICLE

COVID-19: Is It Rare in Neonate?

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Abstract

Background: The Global pandemic COVID-19 affects mainly adult population with serious devastating effects in some of them, particularly those with chronic comorbidities. It is less common in children and rare in neonates.

Objectives: The aim of study was to identify the COVID-19 in neonates so that we can give proper emphasis on neonatal COVID-19.

Methods: This cross sectional study was conducted from April 2020 to August 2020 at Dhaka Shishu (Children) Hospital in Bangladesh. Neonates with suspected COVID-19 were tested for SARS-CoV-2 virus by RT-PCR and positive cases were included in the study. Data were collected and statistical analysis was done by SPSS version 26.

Results: Out of 1714 admitted neonates, 32 (2%) cases were COVID-19 positive. Male were 21(67%) and female were 11 (33%). Majority of the cases (28,88%) were at term. Twelve (38%) cases were from Dhaka and 20 (62%) cases came from outside Dhaka. Only 4(13%) cases were found positive for SARS-CoV-2 virus by RT-PCR within 3 days, among them 2 (6%) cases were within 24 hours of age. Nine cases (28%) were RT-PCR test positive within 4-7 days and 19 cases (59%) were RT-PCR positive within 8-28 days. Most of the cases belonged to neonatal medicine (24,75%) and 8(25%) cases were associated with surgical diseases. Sepsis was present in 17(53%) cases, perinatal asphyxia in 8(25%) and pneumonia in 6(19%) cases. Fourteen cases were discharged after improvement, 12 were referred to COVID-19 designated hospital, 2 cases were transferred to corona unit and 4 cases died.

Conclusion: In this study a good number of neonates were affected with COVID-19. Perinatal asphyxia, sepsis and pneumonia were common association with COVID-19. So for proper management and prevention of transmission of this disease, it should be properly addressed in neonates.

Keywords: COVID-19, neonate.

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Introduction

There was an outbreak of viral pneumonitis in Wuhan, Hubei, China in December 2019.¹⁻³ This global pandemic disease is caused by a novel beta coronavirus species, the 2019 novel coronavirus (2019-nCoV).¹⁻³ It was finally renamed as SARS-CoV-2 (severe acute respiratory syndrome corona virus 2) and the disease was named as COVID-19 (coronavirus disease 2019).¹⁻³

The disease is less common in children and rare in neonate.^{4,5} The first case in neonate with covid-19 was found in china on first February 2020.³ Then 3 cases of neonatal COVID-19 were identified in china up to February 2020.² In Iran first neonatal case was also identified in the month of February.⁶

Due to enhance surveillance of COVID-19 and availability and accessibility of rapid genetic amplification assays, a growing number of pediatric cases with COVID-19 was confirmed in Wuhan and other areas.^{1,5,7} Now the number of neonates with COVID-19 are increasing in different areas of the world.^{2,8,9}

The SARS-CoV-2 causes variety of clinical symptoms especially in respiratory system like mild upper respiratory tract infection, pneumonia, severe pneumonia. Sometime this infection rapidly spreads causing acute respiratory distress syndrome (ARDS), shock and death.^{1,2,10} Most of the children are asymptomatic and have mild clinical manifestations unlike adults. Neonates with COVID-19 have less clinical manifestations.^{2,5}

As increasing the publications, it is found that newborns are susceptible to this disease from COVID-19 positive mother and community, and viruses are detected for a prolonged period; therefore, newborns might play a role in community transmission.¹

So it is important to see the incidence of neonatal COVID-19, so that management of the disease can be taken more appropriately and transmission to health personnel as well as family members can be prevented.

Materials and Methods

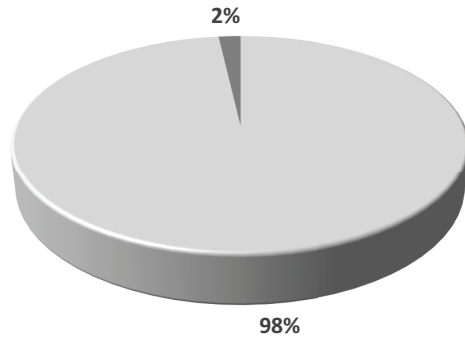
This cross sectional study was conducted from April 2020 to August 2020 at Dhaka Shishu (Children) Hospital (DSH), one of the largest children hospital in south Asia. This is a multidisciplinary tertiary care hospital which is not designated for COVID-19. An isolated corona unit was started at the middle of

July in this hospital. Appropriate written consent was taken before each intervention from the parents of neonates. All neonates who were admitted at this hospital for different reasons were assessed for any suspicion of COVID-19. Clinical suspicions were made by baby born to suspected or confirmed COVID-19 mother, exposed to relatives infected with COVID-19, related with cluster outbreak and with abnormal clinical course such as respiratory distress, fever, not responded with conventional treatment and abnormal chest X-ray. Neonates with suspected COVID-19 were tested for SARS-CoV-2 and it is our hospital protocol to do RT-PCR before going for any operation. Nasal swab was taken with a swab stick by health technologist with all aseptic precautions and wearing PPE (Personal protective instrument). The Swab stick, named COPAN FLOQSwabs (503CS01; COPAN Diagnostics, Brescia, Italy) was introduced into nose at a length similar to half way between ear lobule to same side ala nasi of nose. Then proximal broken swab stick was put into a tube (Falcon tube) filled with 1 mL of 1X RNA shield (D7005; Zymo, Irvine, CA). Finally, RT-PCR (Reverse transcription-polymerase chain reaction) was done for detection of nucleic acid of virus. The method used for this test was real time PCR for SARS-CoV-2 using the TaqPath COVID-19 RT-PCR Kit (A7817; Thermo Fisher Scientific, Waltham, MA). All tests were done in a government approved laboratory. Then all the positives cases were evaluated and cases were either discharged who had features of improvement or referred to COVID-19 designated hospital or transferred to corona unit of Dhaka Shishu (Children) Hospital. The discharged neonates were given proper counselling for breastfeeding, isolation care of baby and also isolation for attendants.

In this study main outcome variable was number of test positive cases for SARS-CoV-2. Data regarding gender, birth weight, gestational age, resident, and associated diseases were collected. The data were entered and analyzed using Statistical Package of Social Science SPSS, version 26. The descriptive statistics such as frequencies, percentages were calculated to summarize nominal and ordinal data, while mean and standard deviation to describe numerical variables.

Results

During this study period total 1714 neonates were admitted. Among them 32(2%) cases were COVID-19 positive (Fig 1).



■ Total admitted neonates ■ Total neonates with COVID-19

Fig 1 Hospital incidence of neonates with COVID-19

Among the cases male were 21(67%) and female were 11 (33%). Male and female ratio was 1.9:1. Term baby was 28(88%) and preterm was 4(12%). Mean weight was 2698 ± 294 g. Twelve (38%) cases were from Dhaka and 20(62%) cases were from outside of Dhaka (Table I).

	Number	Percentage
Male	21	67
Female	11	33
Term	28	88
Preterm	4	12
Weight in g (mean \pm SD)	2698 ± 294	
Dhaka (capital)	12	38
Outside Dhaka	20	62

Only 4 (13%) cases were positive for SARS -CoV-2 virus by RT- PCR within 3 days, among them 2 (6%) cases were within 24 hours of age. Nine (28%) cases were test positive within 4-7 and 19(59%) cases were positive within 8-28 days (Table II).

Age of the cases (day)	Number of cases	Percentage of cases
1-3	4	13
4-7	9	28
8-28	19	59

SARS = severe acute respiratory syndrome; COV- 2 = corona virus 2; RT-PCR = reverse transcription-polymerase chain reaction.

Most of the diseases associated with COVID-19 belonged to neonatal medicine department (24,75%) and 8 (25%) cases were associated with surgical diseases. In neonates two or more diseases coexisted in same cases. Sepsis was present in 17(53%) cases with COVID-19. Perinatal asphyxia was present in 8(25%) and pneumonia in 6(19%) cases (Table III). Among 32 positive cases, 14 cases were discharged after improvement, 12 cases were referred to COVID-19 designated hospital and 2 cases were transferred to corona unit of DSH, which was finally discharged with advice. Four cases died at our hospital (Table IV).

Discussion

This cross sectional study was conducted from April 2020 to June 2020 at Dhaka Shishu (Children) Hospital. All admitted neonates with COVID-19 were taken as cases. During this study period total 1714 neonates were admitted. Among them 32 (2%) cases were COVID-19.

The first case of COVID-19 was detected in Bangladesh at 8th March 2020 who was adult.¹¹ We started RT-PCR for COVID-19 at this hospital in the month of April in this year.

Worldwide the incidence of covid19 in children is very few in contrast to adult and it is rare in neonates.¹² The first children affected by COVID-19 was in china on January, 2020.¹³ Liu et al¹⁴ showed in their study that the incidence of COVID-19 in paediatric age group was 1.6% among the hospitalized children with respiratory tract infection. Another study conducted by Tu et al¹⁵ showed that the incidence of COVID-19 in children was 0.6% among the confirmed cases of all age group. In the month of February several study showed that neonates were also affected by COVID-19.^{3,16} The first neonate with COVID-19 was identified in first February 2020 which was published by Wang et al.³ Then 3 neonates with COVID-19 were identified in that month which was published by Choi et al.¹ At that time in different countries neonates were also affected with COVID-19. In Iran first case of neonatal COVID-19 was found in this month.⁶ Different publications on neonates with COVID-19 showed that the number of neonate with COVID-19 is increasing in the world.^{1,6} But still it is very few unlike adult.⁷ The cause of less neonatal COVID-19 may be the presence of less number of ACE2 receptor in their respiratory tract and their more stronger innate immunity than adult.^{17,18} Surprisingly we see more

Table III
Associated diseases with COVID-19 (N=32)

Name of the Diseases	Admission age of cases (day)	Number of cases	Percentage of cases [#]
Term, Perinatal Asphyxia HIE II ^a with Pneumonia ^c	1 4 15	3	9
Perinatal Asphyxia HIE II ^a with sepsis ^b	22 18 13 4	4	13
Perinatal Asphyxia HIE III with sepsis ^b , Term, IUGR, Jaundice	6	1	3
Neonatal Jaundice with sepsis ^b	5 6 9 11	4	13
Pneumonia ^c with sepsis ^b	20 18	2	6
Term AGA with EONS	8 2	2	6
Term AGA with LONS	20 17 11 14	4	13
*Pneumonia ^c with CHD with syndromic Baby	20	1	3
*Congenital Heart disease	23	1	3
AKI	8	1	3
PUV with B/L TEV	15	1	3
*Occipital Encephalocele	2	1	3
Myelomylengocele	5 1 4 4	4	13
ARM with sepsis ^b	5	1	3
*ARM	22	1	3
Hypertrophic pyloric stenosis	17	1	3

HIE: Hypoxic Ischemic Encephalopathy; IUGR: Intra Uterine Growth Retardation; AGA: Appropriate for Gestational Age; EONS: Early Onset Neonatal Sepsis; LONS: Late Onset Neonatal Sepsis; CHD: Congenital Heart Disease; AKI: Acute Kidney Injury; PUV: Posturetral Valve; B/L: Bilateral; TEV: Telipes Equenovarus, ARM: Anorectal Malformation; *late preterm; ^a perinatal asphyxia 8 cases, ^b sepsis 17 cases, ^c pneumonia 6 cases. # percentage expressed in round figure.

Table IV
Outcome of Neonates with COVID-19 (N=32)

Variable	Number (Percentage [#])
Discharged with advice	14(44)
Transferred to corona Unit*	2(6)
Referred to COVID-19 designated hospital	12(38)
Death	4(12)

*which finally discharged with advice; # percentage expressed in round figure.

number of neonates with COVID-19 (2%, 20 cases) in this study. The neonatal COVID-19 is increasing. It may be due to increase community transmission, and household contact including mother. Though the transmission of SARS- CoV- 2 virus through placenta and breast milk is still unidentified.¹⁹⁻²¹

Among the cases with COVID-19 male were 21(67%) and female were 11 (33%). Male and female ratio was 1.9:1. Term baby was 28(88%) and preterm was 4(12%). Mean weight was 2698±294 g. It was found that in this study male was predominantly affected by COVID-19. The cause of this finding is still unknown. In this study it was found that term and normal weight neonates were affected more. But regarding gender and gestational age, no statistical comparison was done. In one study, it was found that there was no significant sex predominance in children.⁵ In this study Twelve (38%) cases with covid19 lived in Dhaka and 20(62%) cases in outside of Dhaka. This implies that only in Dhaka (capital of Bangladesh) affected cases were more as a single city than rest of the districts. In another study it was found that COVID-19 affected cases were more in city.⁵

In our study only 4(13%) cases were positive for SARS -CoV-2 virus by RT- PCR within 3 days, among them 2(6%) cases were within 24 hours of age. Nine (28%) and 19 (59%) cases were test positive within 4-7 days and 8-28 days respectively. It may imply that most of the cases were affected from community or from family members. In one study it was found that children were affected from community or household contact.¹⁶

It was found in this study that most of the diseases associated with COVID-19 belonged to neonatal

medicine department (24,75%) and only 8(25%) cases were associated with surgical diseases. In neonates two or more diseases coexisted in the same case. Sepsis was present in 17(53%) cases with COVID-19. Perinatal asphyxia was present in 8(25%) and pneumonia in 6(19%) cases.

This hospital is not a COVID-19 designated hospital and all patients were out born. An isolated corona unit was started at the middle of July in this hospital, initially all patients were admitted in another hospital and later referred to this hospital. Newborns with any conditions or diseases was admitted. In this study it was not found whether associated conditions like sepsis and pneumonia were caused by COVID-19 or these conditions were associated with neonatal COVID-19. Several study showed COVID-19 presented with respiratory distress, sepsis like manifestation etc.^{5,10}

In this study among 32 positive cases, 14 cases were discharged after improvement, 12 cases were referred to COVID-19 designated hospital and 2 cases were transferred to our corona unit which was finally discharged with advice. Four cases died at our hospital. In this study exposer history could not be evaluated properly.

We have found significant number of neonates with COVID-19 in this study. These neonats may be a source of transmission of this disease. So, we should give proper emphasis on test, tracing and management of neonatal COVID-19 like adult.

Conclusion

In this study a good number of neonates were affected with COVID-19. Perinatal asphyxia, sepsis and pneumonia were common association with COVID-19. So for proper management and prevention of transmission of this disease, it should be properly addressed in neonates.

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Conflict of interest

There was no conflict of interest.

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