International Journal of Research in Medical Sciences
Sahu S et al. Int J Res Med Sci. 2024 May;12(5):1490-1496
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20241231

Original Research Article

Admission, outcome and referral pattern of admitted neonates: a cross-sectional descriptive study at selected district hospital SNCUs in Odisha

Smitamayee Sahu*, Yayathee Subbarayalu

Faculty of Nursing, Shri Venkateshwara University, Gajraula, Uttar Pradesh, India

Received: 27 March 2024
Accepted: 23 April 2024

***Correspondence:**
Smitamayee Sahu,
E-mail: smitamayee2023@gmail.com

ABSTRACT

Background: The state of Odisha is one of the leading states in the country for infant mortality in India. Odisha has established 44 special neonatal care units (SNCUs) to improve neonatal survival. The study aims to assess the morbidity, mortality, and referral trends to develop targeted suggestions to lower newborn deaths.
Methods: We conducted a cross-sectional descriptive retrospective study on all admitted neonates, taking the secondary data from 8 SNCUs of District Hospitals in the State of Odisha for the period of 3 calendar years (2020-2022). We profiled the type of admission, age, gender, birth weight, admission indication, maturity, mortality profile and referral. Data was extracted in Excel 2021 and analyzed using Excel and Epi info.
Results: Of the 43050 neonates admitted to the SNCU, 21069 (49%) were inborn. There were 58% male neonates. (59%, n=29401) were low birth weight neonates (<2500 gms); out of that, 869 babies (2%) were below 1000 gm. The median duration of stay in the SNCUs was 4 days. Perinatal asphyxia (n=13093) constitutes 30% of the admissions, followed by neonatal jaundice (7561, 18%), low birth weight <1800 gm (5728, 13%), refusal to feed (4745, 11%), and prematurity (n=3888, 9%). 75% of the total were discharged, 11% were referred, 10% died, and 4% left the SNCU against medical advice. The primary reasons for mortality & referral were birth asphyxia, hypoxic ischaemic encephalopathy (HIE), sepsis, and prematurity.
Conclusion: Birth asphyxia is the primary cause of morbidity, mortality, and referral in newborns. Early referrals, effective intervention, and high-quality prenatal care are essential to prevent it.

Keywords: SNCU, Birth asphyxia, Neonate, Low birth weight

INTRODUCTION

The infant mortality rate (IMR) indicates a nation or region's general state of health. The first 28 days of life, or the neonatal period, have the highest risk of death of any stage of childhood (NMR). The IMR in India is currently 28, which is approximately 1/4 of the IMR of 129 in 1971. IMR has decreased roughly 32% in urban areas and 35% in rural areas over the past ten years. The 2020 IMR for States and Union Territories varies from 3 in Mizoram to 43 in Madhya Pradesh. The State Odisha's IMR is 36, and it is one of the leading states, standing 2nd in IMR in the country. The neonatal period accounts for 70% of all infant deaths and more than half of mortality involving children under five. Indeed, almost 45% of all under-five fatalities occur during the first week alone.[1]

The majority of newborn fatalities take place in poor nations. Facility-based newborn care (FBNC) and home-based neonatal care (HBNC) are the two main components of NMR reduction. India has established the FBNC program to improve the state of newborn health in the country, which is part of the RMNCH+A Strategic program under the National Health Mission (NHM).

Under FBNC, newborn care corners (NBCCs) have been established at all delivery points to provide essential newborn care. Newborn stabilisation units (NBSUs) have been established at all Community Health Centers/First Referral Units to manage specific newborn conditions and stabilize severe and sick newborns before referral to higher centers. Except for significant surgeries and assisted ventilation, district and subdistrict hospitals with an annual delivery load of over 3,000 have created SNCUs to care for unwell babies. It is a stand-alone facility with 12 or more beds near the labor room that is run by staff nurses, doctors, and support personnel who have received the necessary training to offer round-the-clock care.[2]

Special newborn care unit was piloted in the Mayurbhanj district of Odisha in 2007 to expand access to specialized facility-based care for newborn newborns. After successful piloting, SNCUs have been scaled up state-wide. Establishing 44 Special neonatal Care Units is a crucial tactic to improve neonatal survival in the state.

In this study, we looked at the patterns of admission, outcome, and referral among neonates admitted to SNCUs over a three-year period for 8 SNCUs in the state. The reasons for admission, type of admission, birth weight, gestational age, morbidities, referral and reason of death were examined, along with year-to-year variations. The objective was to assess the morbidity, mortality, and referral trends to develop targeted suggestions to lower newborn deaths.

METHODS

This descriptive retrospective cross-sectional study uses secondary data from 8 SNCUs of District Hospitals in the State of Odisha. The study period was from January 1st 2020 to December 31st 2022. All newborns admitted during the study period were included in the data, which was further divided into two categories: inborn babies (those born in the hospital where the SNCU was located) and outborn babies (those delivered at home or in other non-SNCU facilities and sent to the SNCU). The study's demographic characteristics included the type of admission, gestational age, birth weight, maturity referral, admission indication, and mortality. The diagnoses made at admission (birth asphyxia, low birth weight, prematurity, respiratory distress, sepsis, etc.) were categorized. The terms "term," "preterm," "low birth weight," "very low birth weight," and "extremely low birth weight" were all defined according to WHO guidelines. The SNCU web database provided the data that was entered into Microsoft Excel (2021) sheets. The study employed descriptive statistics to evaluate clinical features, demographic factors, and neonatal outcomes. Time distribution was analyzed using a line diagram plotted month and year-wise. The analysis of Chi-squared tests to determine the degree of correlation was conducted using the Epi-Info software version 7.2.5.0.

RESULTS

Figure 1 shows the upward trend of neonates' admission at the SNCUs from January 2020 to December 2022. In the Months of September 2020 and February and June 2021, there was a downward trend of Admissions at the SNCUs. The reason was the COVID-19 upsurge during those periods in Odisha State.

Total of 43050 neonates were admitted to SNCU for their illnesses. 21889 (51%) babies were below one day, and Males were 24990 (58%) (Table 1). Outborn units had 21981 (51%) admissions, and preterm babies had 12610 (29%). 25352 (59%) neonates were Low birth weight babies (below 2500 gms), and out of that, 4570 (11%) were very low birth weight babies (1000-1499 gm), 869 babies (2%) were below 1000 gm (extremely low birth weights). Out of 21981 neonates admitted from outside the health facility, 15731 outborn neonates (72%) used Government vehicles, and 6250 (28%) used self-arranged vehicles to reach the SNCU.

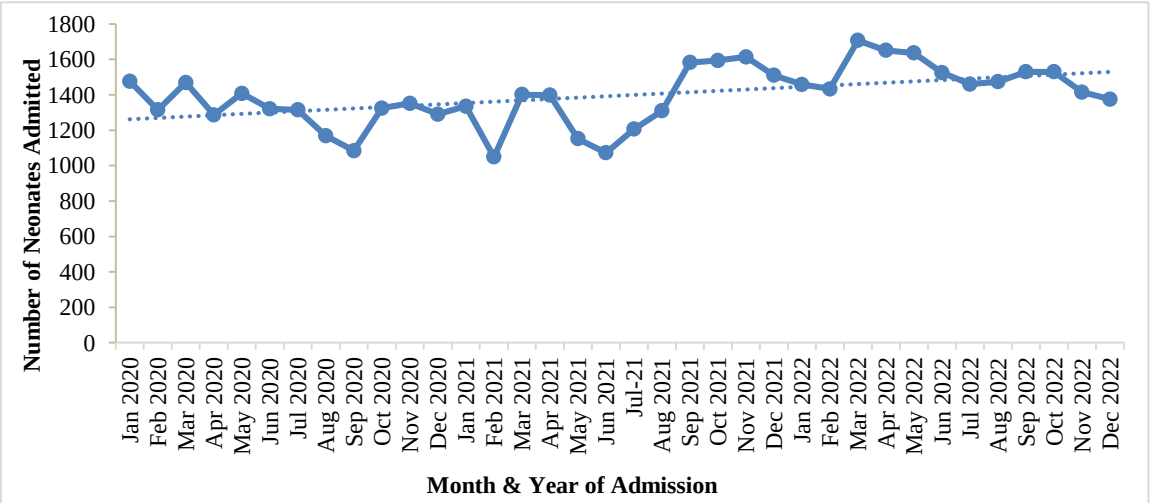

Figure 1: Month-wise admission pattern of admitted neonates, 8 SNCUS, district hospitals, Odisha, 2020-22 (n=43050).

Table 1: Admission profile of neonates (n=43050), 2020-2022.

Person characteristics	Number (N)	Proportion (%)
Age group (days)	**43050**	
<1	21889	50.85
1-3	10129	23.53
4-7	4194	09.74
>7	6838	15.88
Gender	**43050**	
Male	24990	58.05
Female	18027	41.87
Agender	33	00.08
Delivery Location	**43050**	
Same health facility (inborn)	21069	49
Other health facilities (outborn)	21981	51
Maturity (weeks)	**43050**	
Full-term (37-42)	28894	67.12
Pre-term (<37)	12610	29.29
Post-term (≥42)	1546	03.59
Birth weight (g)	**43050**	
Normal (≥2500)	17698	41.11
Low birth weight (1500-2499)	19913	46.25
Very low birth weight (1000-1499)	4570	10.62
Extremely low birth weight (<1000)	869	2.12
Mode of transportation used by out borns to SNCUs	**21981**	
Government vehicle	15731	72
Self-arranged	6250	28
Duration of stay (days)	**43050**	
0-4	26174	60.80
5-9	10498	24.39
10-14	1947	04.52
>15	4431	10.29

Duration of stay of admitted neonates, 8 SNCUs, 2020-2022

The median average length of stay for newborns hospitalized in the SNCUs is four days, ranging from 0 to 98 days.

Table 2 shows the reason for admission of the Neonates at the 8 SNCUs, 2020-2022. There was no significant change in the causes of admissions over the period of three years. The table shows the counts and percentages of reasons for admission to a hospital or medical facility over the years 2020, 2021, and 2022. The top 5 reasons are displayed - perinatal asphyxia, low birth weight, neonatal jaundice, refusal to feed, and prematurity.

Perinatal asphyxia (n=13093) continued to constitute nearly 30% of the admissions, neonatal jaundice (7561, 18%), low birth weight <1800 g (5728, 13%), refusal to feed (4745, 11%), and prematurity (<34 weeks) (3888, 9%). The chi-square test results indicate to be highly significant with a p value <0.0001 (chi squared value 326.74).

Table 3 connotes that approximately 85% of the newborns admitted with the most typical morbidities were born at public facilities at various levels. After applying the single table chi-square test, these observations were found to be highly significant with a p value <0.0001 (Chi-squared value 1711.95).

Out of the 43050 neonates admitted, 32136 (or 75% of the total) were well enough to be discharged, 4625 (or 11% of the total) were sent to higher-level hospitals for better care, 4356 (or 10% of the total) were pronounced dead, and 1933 (or 4% of the total) were left the SNCU against medical advice (Figure 2).

Total of 4356 (10%) of the 43050 neonates admitted to the hospital died (Table 4). The top five reasons of death for the admitted infants were birth asphyxia (1399, 32%), neonatal sepsis (603, 14%), hypoxic ischemic encephalopathy (HIE) of newborn (487, 11%), prematurity, defined as birth between 28 and 37 weeks (440,10%), and extremely low birth Weight (999 gm or less) (388, 9%).

Table 2: The reason for admission of the neonates at the 8 SNCUS, 2020-2022.

Reason of admission	2020	%	2021	%	2022	%	Total	%
Perinatal asphyxia	4262	32	4181	30	4650	30	13093	30
Low birth weight <1800 gm	2035	15	1864	13	1829	12	5728	13
Neonatal jaundice	1854	14	2425	17	3282	21	7561	18
Refusal to feed	1417	11	1593	11	1735	11	4745	11
Prematurity <34 weeks	1339	10	1301	9	1248	8	3888	9
Any other	900	7	814	6	463	3	2177	5
Respiratory distress (rate>60 or grunt/retractions)	424	3	444	3	635	4	1503	3
Congenital malformation	360	3	358	3	327	2	1045	2
Meconium aspiration	172	1	195	1	280	2	647	2
Hyperthermia >37.5 c	171	1	202	1	427	3	800	2
Abdominal distension	129	1	136	1	157	1	422	1
Neonatal convulsions	127	1	128	1	138	1	393	1
Hypoglycemia <45 mg%	95	1	71	1	108	1	274	1
Hypothermia <35.4 c	52	0	154	1	133	1	339	1
Large baby (>4 kg. At 40 weeks)	23	0	22	0	37	0	82	0
Bleeding	22	0	12	0	18	0	52	0
Diarrhoea	22	0	28	0	30	0	80	0
Apnea/gasping	21	0	18	0	32	0	71	0
Baby of diabetic mother	21	0	14	0	25	0	60	0
Oliguria	18	0	7	0	29	0	54	0
Central cyanosis	11	0	5	0	11	0	27	0
Shock	4	0	4	0	1	0	9	0
Total	13479	100	13976	100	15595	100	43050	100

Table 3: Place of delivery for the common morbidities of admitted newborns (n=43050).

Place of Delivery	Birth Asphyxia	LBW <1800g.	Jaundice	Refusal to feed	Pre term	Others	Total
SHC, PHC, CHC, DH	11315 (86)	4704 (82)	6831 (90)	3903 (82)	3101 (80)	6651 (83)	36505 (85)
Private nursing home	783 (6)	227 (4)	448 (6)	225 (5)	225 (6)	367 (5)	2275 (5)
Other dist.	768 (6)	214 (4)	190 (3)	273 (6)	91 (2)	617 (8)	2153 (5)
Home	135 (1)	456 (8)	77 (1)	282 (6)	347 (9)	315 (4)	1612 (4)
Govt. ambulance	73 (1)	9992)	9 (0)	45 (1)	94 (2)	72 (1)	392 (1)
Other vehicle	19 (0)	28 (0)	6 (0)	17 (0)	30 (1)	13 (0)	113 (0)
Total	**13093 (100)**	**5728 (100)**	**7561 (100)**	**4745 (100)**	**3888 (100)**	**8035 (100)**	**43050 (100)**

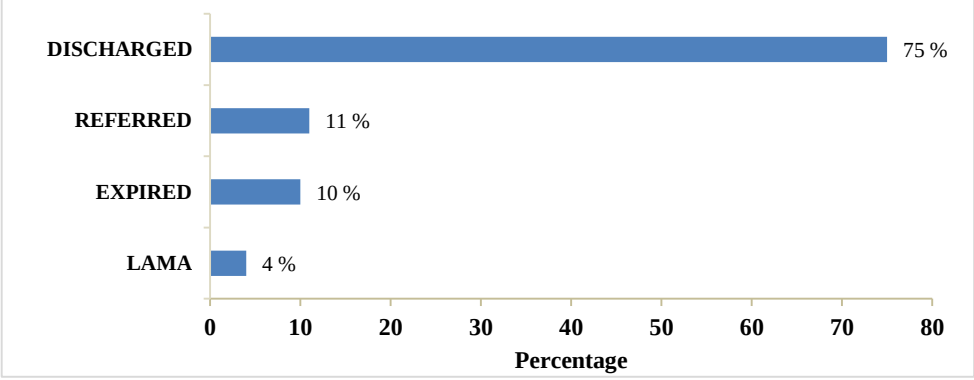

Figure 2: The outcome of the admitted neonates, 8 SNCUs, 2020-2022.

Table 4: The reasons for the mortality of admitted neonates, 8 SNCUs, 2020-2022 (n=4356).

Reason for death	Number	Percentage
Birth asphyxia	1399	32.1
Neonatal sepsis	603	13.8
HIE of newborn	487	11.2
Prematurity (28-<37 weeks)	440	10.1
E.L.B.W. (999 gm or less)	388	8.9
Other low birth weight(1000-2499 gm)	348	8.0
RDS of newborn (HMD)	179	4.1
Extreme immaturity (<28 Weeks)	177	4.1
Congenital malformation	107	2.5
Any other diagnosis	102	2.3
Any other diagnosis	57	1.3
Neonatal sepsis	26	0.6
Neonatal aspiration of meconium	24	0.6
Acquired pneumonia	19	0.4
Total	4356	100

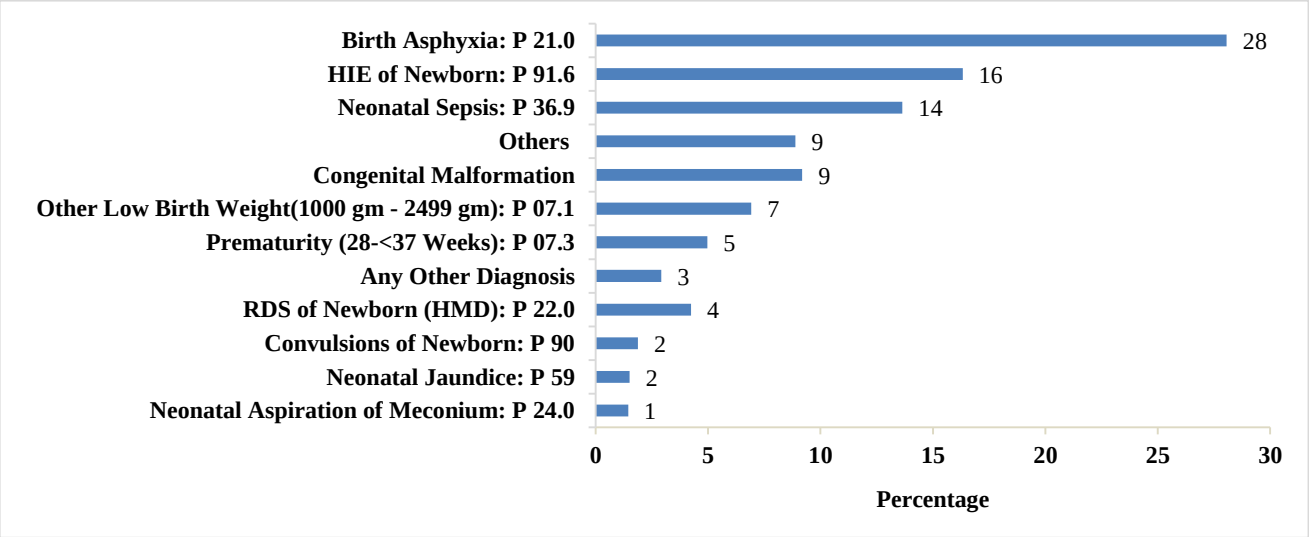

Figure 3: The reasons for the referral of admitted neonates, 8 SNCUs, 2020-2022 (n=4625).

Birth asphyxia was the primary reason for referral to higher centers (Figure 3). 1298 neonates (28%) were referred for Birth Asphyxia to higher Centres for treatment. Other major reasons for referral were hypoxic ischemic encephalopathy (hie) of newborns (755, 16%) and neonatal sepsis 631 (14%).

DISCUSSION

Our study reports specific morbidities, mortalities, and referrals of neonates admitted to SNCUs. A total of 43050 neonates (49% inborn and 51% outborn) were admitted to SNCU during the study period (January 2020 to December 2022). Other research conducted in Uttarakhand, India by Kumar et al revealed different results (inborn 60.8%, outborn 39.2%).[3] In Tezpur, Assam, India, Rahman et al reported (inborn 64.7%, outborn 35.2%); Randad et al reported (inborn 76.46%, outborn 23.54%); Mendu et al reported (inborn 82.76%, outborn 17.24%); Anupama et al reported (inborn 60.5%, outborn 39.5%); and Prasanna et al reported (inborn 58.5%, outborn 41.5%) in Telangana state.[4-8]

Compared to female babies (42%), male babies (58%) accounted for most admissions, pertinent to studies conducted by Jena et al and Shah et al.[12,16] Similar results were found in the research conducted by Sharma et al at Gwalior, Madhya Pradesh (63.07% vs. 36.92%), Rahman et al at Tezpur, Assam (58.7% vs. 41.2%), Kumar et al in Uttarakhand, India (59.54% vs. 40.46%), Som et al in Odisha (60.2% vs. 39.8%), and Modi et al in Gujarat, India (56.36% vs 43.63%).[3,4,9-11] It may be necessary to do additional research to comprehend the preferential health-seeking behavior that male babies exhibit fully.

Overall, 59% of the babies in the current study were LBW. In previous research, the percentage of LBW admissions was 49.8% for Rahman et al in Tezpur, Assam; 47.7% for

Anupama et al in Silchar, Assam; 61.5% for Sharma et al in Gwalior, Madhya Pradesh; Shah et al (63.00%), and Baruah et al (66.10%) and 61.6% for Rakholia et al in Uttarakhand, India and all studies' results are smilar to that of our study.[4,7,9,14-16] Overall, 29% of the newborns in the current study were preterm, and 67% were term.

Among the babies admitted, birth asphyxia accounts for 30 percent of the morbidities, followed by jaundice (18%), low birth weight <1800 gm (13%), refusal to feed (11%), and prematurity < 34 weeks (9%). Birth asphyxia is much more common than expected. The figure was more than the previous studies conducted by Ravikumar et al (15.7%), Shah et al (16.00%) and Baruah et al (16.70%).[3,14,16] Strict intrapartum surveillance will be beneficial for identifying birth asphyxia early on.

This can be attributed to several factors, including poor prenatal care, delayed referrals of high-risk mothers, limited access to healthcare facilities, subpar intra-natal care, delayed caesarean sections in cases of prolonged labor, and inadequate neonatal resuscitation. Additional research could clarify the factors listed above. One of the most important ways to lower neonatal jaundice is to counsel families about physiological jaundice and the need to continue to breastfeed their children.

The overall mortality was 10%, which was comparable to research conducted in Tezpur, Assam, by Rahman et al (11.4%) and at Silchar, Assam, by Anupama et al (12.37%).[4,7] Newborn referral and mortality resulted primarily from birth asphyxia, hypoxic ischaemic encephalopathy (HIE), sepsis and prematurity (Table 4, Figure 3). Referral (10%) could potentially be attributed to the fact that all units offer Level II SNCU services and are sent to tertiary facilities for ventilatory support or other interventions.

Limitations

The study was conducted during COVID-19 pandemic period; hence the study results cannot be attributable to post- and pre-covid period.

CONCLUSION

According to our study, the primary cause of morbidity, mortality, and referral was birth asphyxia. Enhancing crucial preventive services, such as early referrals, effective intervention at the health facilities, and high-quality prenatal care, could help avoid these. Increasing the follow-up on babies who are discharged may aid in spotting any developmental delays and facilitating an early referral to the Rashtriya Bal Surakshya Karyakram (RBSK) program. Understanding the "Levels of delay"- delay in making decisions, delay in getting transportation, and delay in arriving at the facility-and the referral process used to get to medical institutions is essential. The high rate of birth asphyxia in inborn newborns highlights the importance of concentrating on problems related to protracted labor, the standard of prenatal care, being prepared for a caesarean section when necessary, and neonatal resuscitation. Improving the labor room staff's abilities and ensuring enough human resources are available will significantly impact the standard of intra-natal care. Preventing birth asphyxia would include concentrating on intra-natal care and doing infant resuscitation within the "golden minute." The provision of surfactants and CPAP (continuous positive airway pressure) to manage premature neonates could fortify SNCUs and lower the number of deaths associated with RDS. Their capacities must be improved for the delivery room staff to care for mothers and their babies competently. The efficient operation of the newborn care centers and stabilization units would reduce the need to refer infants who could be handled and stabilized at the level of hospitals, preventing needless referrals and the stress associated with transportation. Reducing neonatal problems would mainly depend on improving the standard of delivery care and the state's labor process.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Sample registration system (SRS)-bulletin 2020 volume 55-I. India. Available at: https://censusindia.gov.in/nada/index.php/catalog/42687. Accessed on 25 May 2022.
2. Strengthening facility-based Paediatric Care. (n.d.). https://nhm.gov.in/images/pdf/programmes/childhealth/guidelines/Strenghtening_Facility_Based_Paediatric_Care-Operational_Guidelines.pdf; 2022.
3. Kumar R, Mundhra R, Jain A, Jain S. Morbidity and mortality profile of neonates admitted in special newborn care unit of a teaching Hospital in Uttarakhand, India. Int J Res Med Sci. 2019;17(1):241-6.
4. Rahman K, Begum R. Morbidity and mortality profile of neonates admitted in a special care newborn unit of a tertiary care teaching hospital of Assam, India. The New Indian Journal of OBGYN. 2020;7(1):82-7.
5. Randad K, Choudhary D, Garg A, Jethaliya R. Pattern of neonatal morbidity and mortality: A retrospective study in a special newborn care unit, Mumbai. Indian J Child Health. 2020;7:299-303.
6. Mendu SB, Kota V, Neela AR, Bukkapatnam SB. Morbidity and mortality profile of neonates admitted in special newborn care unit in tertiary care centre in rural area of Telangana State, India. Int J Sci Stud. 2021;9(8):25-30.
7. Anupama D, Bidyut BN, Anjana TN. Morbidity and mortality profile of newborns admitted to the neonatal intensive care unit of a tertiary care teaching hospital of Assam. J Med Sci Clin Res. 2020;8:697-702.

8. Prasanna CL, Suneetha B, Prabhu GR, Prakash PS. Morbidity and mortality pattern among babies admitted in special newborn care unit, Nellore, Andhra Pradesh, India. Int J Contemp Pediatr. 2019;6:1898-903.
9. Sharma AK, Gaur A. profile of neonatal mortality in special newborn care unit of tertiary care hospital. Int J Contemp Pediatr. 2019;6:4205.
10. Som M, Nayak C, Padhi BK, Ashwani N. Patterns of morbidity among newborns admitted in SNCU of Odisha, India. Int J health Sci Res. 2018;8(9):10-9.
11. Modi R, Modi B, Patel JK, Punitha KM. Study of the morbidity and the mortality pattern in the neonatal intensive care unit at a tertiary care teaching hospital in Gandhinagar District, Gujarat, India. J Res Med Den Sci. 2015;3(3):208-12.
12. Jena D, Tripathy RM, Pradhan S. Assessment of socio-clinical profile of neonates admitted in sick neonatal care unit of tertiary care hospital: Odisha. Int J Res Med Sci 2017;5(9):4077-81.
13. Sridhar PV, Thammanna PS, Sandeep M. Morbidity pattern and Hospital outcome of Neonates admitted in a Tertiary care Teaching Hospital, Mandya. Int J Sci Stud. 2015;3(6):126-9.
14. Baruah MN, Panyang PP. Morbidity and Mortality Profile of Newborns Admitted to the Special Care Newborn Unit (SCNU) of A Teaching Hospital of Upper Assam, India – A Three Year Study. JMSCR. 2016;4(8):11689-95.
15. Rakholia R, Rawat V, Bano M, Singh G. Neonatal morbidity and mortality of sick newborns admitted in a teaching hospital of Uttarakhand. CHRISMED J Health Res 2014;1(4):228-34.
16. Shah GS, Yadav S, Thapa A. Clinical profile and outcome of neonates admitted to neonatal intensive care unit (NICU) at a tertiary care centre in Eastern Nepal. J Nepal Paediatr Soc. 2013;33(3):177-81.

Cite this article as: Sahu S, Subbarayalu Y. Admission, outcome and referral pattern of admitted neonates: a cross-sectional descriptive study at selected district hospital SNCUs in Odisha. Int J Res Med Sci 2024;12:1490-6.