Journal of Cardiovascular Disease Research
ISSN:0975-3583,0976-2833 VOL13,ISSUE08,2022

Original research article

Study of incidence of congenital anomalies in newborns

[1]Dr. Natwar Lal Gaur, [2]Dr. Prachi Saffar Aneja, [3]Dr. Heena Chaudhary, [4]Dr. Buddhadeb Ghosh
[1]Assistant Professor, Department of Anatomy, Index Medical College Hospital and Research Center, Khudel, Indore, Madhya Pradesh, India
[2]Professor, Department of Anatomy, SGT Medical College Hospital and Research Institute, Budhera, Gurugram, Haryana, India
[3]Associate Professor, Department of Anatomy, Zydus Medical College and Hospital, Dahod, Gujarat, India
[4]Assistant Professor, Department of Anatomy, Apollo Institute of Medical Sciences and Research Hyderabad, Telangana, India
Corresponding Author:
Dr. Natwar Lal Gaur

Date of submission: 25 Oct 2022, **Date of Review:** 18 Nov 2022, **Date of Acceptance:** 05 Dec 2022, **Date of publishing:** 27 Dec 2022

Abstract

Background: Congenital malformation means morphogenesis defects present at birth. Purpose of this study is to determine the incidence of overt congenital anomalies in newborns in hospital deliveries.
Materials and Methods: An observational cross-sectional study was done on 1082 newborns born in the Department of Obstetrics and Gynecology and Pediatrics in the KD Medical College Hospital and research center Mathura Uttar Pradesh.
Results: The overall incidence of all types of congenital malformations over the two years was 1.94%. Nervous system malformations (33.33%) were most commonly found, followed by multiple congenital anomalies (23.81%) and gastrointestinal tract anomalies (19.05%). A higher risk of incidence of congenital anomalies were observed in preterm, low birth weight and male newborns.
Conclusion: This study was able to provide a rough estimate of the incidence of congenital anomalies in Mathura region. Congenital anomalies are a major cause of stillbirths and newborn mortality. This study could be useful for prevention, early diagnosis and timely management of life-threatening congenital anomalies.
Keywords: Congenital, anomalies, incidence, low birth weight, newborns

Introduction

Congenital anomalies represent structural defects during early fetal life. An Average of 50% of congenital anomalies are linked with many risk factors like chromosomal disorders, environmental, socioeconomic and demographic, chemicals, maternal illnesses like diabetes mellitus, folic acid deficiency and exposure to addictive drugs including alcohol and tobacco. The report of World Health Organization (WHO) 2022 says that 94% of severe congenital anomalies are found in the low and middle income countries [1]. Congenital malformations account for 8–15% of perinatal deaths and 13–16% of neonatal deaths in India [2, 3]. The patterns of congenital anomalies vary by geographical area [4]. In different countries, the prevalence of congenital anomalies observes between <1% to 8% [5]. In a growing country like India because of high occurrence of irresistible illnesses, dietary problems and social pressure, the formative imperfections are regularly over shadowed, yet the current situation is evolving quickly. Numerous anomalies are serious and cause abortion. Congenital anomalies address inadequate morphogenesis during early fetal life. Major anomalies have serious medical, and surgical results [6]. Congenital anomalies can be classified into two groups- minor and major defects. Minor defects have a low affect on organs function and no need for urgent intervention. Other hands, the major defects have a high affect on organs as well as body function and may cause serious conditions, thus requiring instant intervention [7].Congenital anomalies may develop in any system of body but the commonest types are cleft lip/palate, congenital heart defects, anencephaly, hypospadias and Down syndrome [8]. Newborns with low birth weight are much higher chances to develop congenital anomalies [7]. Congenital anomalies are now etiologically considered as the outcome of intricate interaction between host and environment [9]. The aim of this study was to determine the overall incidence of overt congenital anomalies and describe their types among newborns in the Mathura region.

Materials and Methods

An observational cross-sectional study was done for a duration of two years i.e., from 1st January 2017 to 31st December 2019. A total of 1082 newborns born (live and still born) in the Department of Obstetrics and Gynecology, KD Medical College Hospital & Research Center Mathura, Uttar Pradesh were enrolled after approval from the institution's ethical committee.
An informed consent was obtained from parents. Newborn's gestational age, birth weight, sex and relevant maternal and family history were noted in a pre-designed proforma. The diagnosis was made by

a pediatrician examining the newborn at birth. All the newborns were recorded for overt congenital malformations within 24 hours of birth. If they were not qualified with a syndrome, then the anomaly is referred to the particular affected system. When more than two systems were affected, it was noted as multiple congenital anomalies. The congenital anomalies were divided into nervous system, multiple congenital anomalies, gastrointestinal tract, musculoskeletal, cardiovascular system, respiratory system and genetic disorders.

Observations and Results

In this study total of 1082 consecutive births were studied for congenital malformation. There were 21 malformed newborns observed. The overall incidence of congenital malformations was found to be 1.94% as shown in [Table-1].

Table 1: Incidence of congenital anomalies

Total number of deliveries	1072
Total number of twin deliveries	10
Total number of triplet deliveries	0
Total number of babies born	1082
Total number of malformed babies	21
Incidence of anomalies	1.94%

Out of total 1082 babies, Congenital anomalies of the central nervous system 7(33.33%) were the highest followed by multiple congenital anomalies 5(23.81%), gastrointestinal system 4(19.05%), cardiovascular system 2(9.52%), respiratory system 2(9.53%) and musculoskeletal system 1(4.76%) as shown in table-2.

Table 2: Distribution of system-wise incidence of congenital anomalies.

S. No	System	Number of Malformed newborns			%
		Male	Female	Total	
1	Nervous System	6	1	7	33.33%
2	Multiple congenital anomalies	3	2	5	23.81%
3	Gastrointestinal tract	3	1	4	19.05%
4	Musculoskeletal system	1	0	1	4.76%
5	Cardiovascular system	2	0	2	9.52%
6	Respiratory system	1	1	2	9.53%
7	Genetic disorders	0	0	0	0
	Total	16	5	21	

Incidence of malformations in general was found to be apparently more in male (2.87%) than in female (0.95%) newborns [Table-3].

Table 3: Distribution of incidence of congenital anomalies by gender of newborn.

Sex of newborn	Total number of newborns	Number of malformed newborns	%
Male	558	16	2.87
Female	524	5	0.95
Total	1082	21	

Discussion

In present study observed overall incidence of congenital malformations was 1.94%. This finding compares well with the observations of Ghose *et al*., [10] (1.5%), Mohanty *et al*., [11] (1.61%), Swain *et al*., [12] (1.2%), Singh A *et al*., [13] (1.5%), Taksande A *et al*., [14] (1.9%), Parmar A *et al*., [15] (0.88%), Gaur S *et al*., [16] (0.43%), Thaddanee R *et al*., [17] (1.23%), Prashar N *et al*., [9] (1.85%) and Kokate P *et al*., [18] (0.9%) it was low to present finding. Marden *et al*., [19] (2-4%), Goravalingappa JP *et al*., [20] (3.13%), Verma IC *et al*., [21] (3.6%), Guha DK [22] (2%), Shamim S *et al*., [23] (13.22%), Herbert *et al*., [24] (2.8%), Sarkar S *et al*., [25] (2.22%), Francine R *et al*., [26] (2.4%), Shah K *et al*., [6] (2.38%), Sundaram J *et al*., [27] (2.39%) and Kamal NM *et al*., [28] (3.3%), it was high to present finding [Table- 4].

The geographic and racial differences are main factors responsible for relative difference in the occurrence of various malformations. "The incidence of congenital anomalies depends upon various factors, so the two works are never strictly comparable" [6].

In this study, the incidence of congenital anomalies was higher in preterm, low birth weight and male newborns. According to the annual report of Indian Council of Medical Research (ICMR) that the commonest congenital anomalies are shown in cardiovascular system (0.57%) [29].

The present study showed that the most frequent malformations was central nervous system(CNS) malformations (33.33%) followed by multiple congenital anomalies (23.81%) malformations, malformations of the gastrointestinal tract (19.05%), respiratory tract (9.53%) defects malformations,

cardiovascular system(CVS) malformations (9.52%), musculoskeletal system defects malformations (4.76%) and genetic disorders malformations (0%) [Table-2].

Table 4: Showing the incidence of congenital anomalies in different areas by various studies.

S. No	Authors	Place of study	Publi-cation year	Incidence of Congenital Anomalies	Male : Female ratio
1.	Swain *et al*., [12]	Varanasi, Uttar Pradesh, India.	1994	1.2	1.08:1.33
2.	Singh A *et al*., [13]	Jammu, India.	2009	1.5	1.6:1.4
3.	Parmar A *et al*., [15]	Bhavnagar, Gujarat, India.	2010	0.88	1:1.6
4.	Taksande A *et al*., [14]	Wardha Maharashtra, India.	2010	1.9	1.6:1
5.	Samina *et al*., [23]	Karachi, Pakistan.	2010	13.22	3.10:2.60
6.	Herbert *et al*., [24]	Enugu, Nigeria.	2012	2.8	-
7.	Shah K *et al*., [6]	Ahmedabad Gujarat, India.	2013	2.38	2.43:2.20
8.	Shatanik Sarkar *et al*., [25]	Kolkata, West-Bengal India.	2013	2.22	2.9:1.5
9.	Rizk Francine *et al*., [26]	Beirut, Lebanon.	2014	2.4	7:5
10.	Gaur S *et al*., [16]	Jodhpur, Rajasthan, India.	2015	0.43	0.60:0.25
11	Prashar N *et al*., [9]	Jammu and Kashmir, India	2016	1.85	-
12	Sundaram J *et al*., [27]	Madurai Tamilnadu, India.	2017	2.39	-
13	Kamal NM *et al*., [28]	Sulaimaniyah, Iraq	2018	3.3	3.6:3.0
14	Present study	Mathura, Uttar Pradesh, India.	2022	1.94	2.87:0.95

Studies by Goravalingappa *et al*., [20] and Guha DK [22] also reported high incidence of central nervous system malformations. While Ghosh *et al*., [10] and Mohanty *et al*., [11] have reported that a high incidence of anomalies was in musculoskeletal defects malformations. The present study observed that the overall incidence of congenital anomalies was higher in preterm as compared to full-term newborns. Goravalingappa JP *et al*., [20] also found the similar results.

This study, observed that male newborns had higher incidence of congenital anomalies than female newborns. Ratio of malformed male to female newborns was found 2.87:0.95. A similar ratio of malformed newborns(male : Female) has also been reported by Mohanty C *et al*., [11] (1.91:1.27), Singh A *et al*., [13] (1.6:1.4), Shamim S *et al*., [23] (31:26), Taksande A *et al*., [14] (1.63:1) Shah K *et al*., [6] (2.4 : 2.2), Sarkar S *et al*., [25] (2.9:1.5), Francine R *et al*., [26] (7:5), Gaur S *et al*., [16] (0.60 : 0.25) and Kamal NM *et al*., [28] (3.6 : 3). Against to present study that Swain *et al*., [12] (1.08:1.33) and Parmar A *et al*., [15] (1: 1.6) observed that incidence of congenital anomalies were higher in female newborns [Table- 4].

Conclusion

This study brings out the incidence of congenital anomalies in a rural region. From present study it has been concluded that Nervous system & Multiple congenital anomalies contribute to more than 50% of them. The Congenital anomalies are a main cause of still birth and newborn mortality. To decrease the incidence of different congenital anomalies in a particular region, it is important that the distribution of congenital anomalies are detected in that region and country as whole.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee.

References

1. World Health Organization. Congenital anomalies. Geneva: WHO; 2022. Fact sheet N370.Updated February 2022. Available From: www.who.int/mediacentre/factsheets/fs370/en/. (Accessed August, 2022)
2. Chaturvedi P, Banerjee KS. Spectrum of congenital malformations in newborns from rural Maharashtra. Indian J Pediatr. 1989;56:501-7.
3. Datta V, Chaturvedi P. Congenital malformations in rural maharastra. Indian paediatrics.

2000;37:998-1001.
4. Russo MG, Paladini D, Pacileo G, Ricci C, Di Salvo G, Felicetti M. Changing spectrum and outcome of 705 fetal congenital heart disease cases: 12 years, experience in a third-level center. J Cardiovasc Med. 2008;9:910-5.
5. Singh K, Krishnamurthy K, Greaves C, Kandamaran L, Nielsen AL, Kumar A. Major congenital malformations in barbados: the prevalence, the pattern, and the resulting morbidity and mortality. ISRN Obstet Gynecol. 2014;2014:651783.
6. Shah K, Pensi CA. Study of Incidence of Congenital Anomalies in Newborn. GMJ. 2013;68(2):97-9.
7. Hussain S, Asghar I, Sabir MU, Chattha MN, Tarar SH, Mushtaq R. Prevalence and pattern of congenital malformations among neonates in the neonatal unit of a teaching hospital. JPMA. 2014;64:629-34.
8. Lamichhane DK, Leem JH, Park M, Kim JA, Kim HC, Kim JH. Increased prevalence of some birth defects in Korea, 2009-2010. BMC Pregnancy Childbirth. 2016;16:61.
9. Prashar N, Gupta S, Thakur R, Sharma P, Sharma G. A study of incidence of congenital anomalies in newborn: a hospital based study. Int J Res Med Sci. 2016 Jun;4(6):2050-3.
10. Ghosh S, Bhargava SK, Bhtani R. Congenital anomalies in longitudinally studied birth cohort in a urban community. Indian J Med Res. 1985 Nov;82:427-33.
11. Mohanty C, Mishra OP, Das BK, Bhatia. Congenital malformations in newborns: A study of 10,874 consecutive births. J Anat Soc India. 1989;38:101-11.
12. Swain S, Agrawal A, Bhatia BD. Congenital Malfunction at Birth. Indian Pediatrics. 1994 Oct; 31:1187-91.
13. Singh A, Gupta RK. Pattern of Congenital Anomalies in newborn: A hospital based Prospective study. JK Science. 2009 Jan-Mar; 11(1):34-6.
14. Taksande A, Vilhekar K, Chaturvedi P, Jain M. Congenital malformations at birth in Central India: A rural medical college hospital based data. Indian J Hum Genet. 2010;16(3):159-63.
15. Parmar A, Rathod SP, Patel SV, Patel SM. A study of congenital anomalies in newborn. NJIRM. 2010 Jan-Mar;1(1):13-7.
16. Gaur S, Kataria SK, Raichandani L, Agarwal R, Joya HK. Study of incidence of congenital anomalies in newborns in western Rajasthan. International Journal of Applied Research. 2015;1(8):772-4.
17. Thaddanee R, Patel HS, Thakor N. A study on incidence of congenital anomalies in newborns and their association with maternal factors: a prospective study. Int J Contemp Pediatr. 2016 May;3(2):579-82.
18. Kokate P, Bang R. Study of congenital malformation in tertiary care centre, Mumbai, Maharashtra, India. Int J Reprod Contracept Obstet Gynecol. 2017 Jan;6(1):89-93.
19. Clark RD, Eteson DJ. Congenital anomalies. In Schaffer and Avery's Diseases of the Newborn WB Saunders, Philadelphia; c1991. p. 159-191.
20. Goravalingappa JP, Nashi HK. Congenital Anomalies in a study of 2398 consecutive births. Indian Journal of medical research. 1979 Jan;69:140-6.
21. Verma IC, Mathews AR. Clinical & Genetics aspects of anomalies of CNS. All India Institute of Med. Science. 1976;1:64.
22. Guha DK. Neonatology. First Edition; c1995. p. 466.
23. Shamim S, Chohan N, Qmar S. Pattern of congenital malfunctions and their neonatal outcome. Journal of Surgery Pakistan. 2010 Jan-Mar;15(1):34-7.
24. Obu HA, Chinawa JM, Uleanya ND, Adimora GN, Obi IE. Congenital malfunction among newborns admitted in the neonatal unit of a tertiary Hospital in Enugu, South- East Nigeria- a retrospective study. BMC Notes. 2012;5(177):1-6.
25. Sarkar S, Patra C, Dasgupta MK, Nayek K, Karmakar PR. Prevalence of congenital anomalies in neonates and associated risk factors in a tertiary care hospital in eastern India. J Clin Neonatol. 2013;(3):131-4.
26. Francine R, Pascale S, Aline H. Congenital anomalies: prevalence and risk factors. Universal Journal of Public Health. 2014;2(2):58-63.
27. Sundaram J, Kavitha DS. A study of incidence of congenital anomalies in a tertiary care centre. Int J Adv Res. 2017;5(7):1242-50.
28. Kamal NM, Othman N. Incidence and types of congenital anomalies in newborns in Sulaimaniyah city, Iraq. Acta Medica Iranica. 2018;56(12):769-76.
29. Indian Council of Medical Research, New Delhi: Reproductive health; Annual report, 2002-03; p 91. Available From: https://main.icmr.nic.in/sites/default/files/annual_repoorts/Anuual- Report-2002-2003-Content-English-ICMR-Headquarters-Delhi.pdf (Accessed September, 2022).