ORIGINAL RESEARCH

Prevalence and Pattern of Gastro-Intestinal Tract Malformation in Neonates at a Tertiary Care Centre in Rajasthan, Western India

[1]Dr. Mamta Bajad, [2]Dr. Lalit Prakash Mali, [3]Dr. Manoj Kumar, [4]Dr. Jai Prakash Narayan

[1]Assistant Professor, [2,4]Associate Professor, Department of Pediatrics, JLN medical College, India
[3]Assistant Professor, Department of Gastroenterology, JLN Medical College, India

Corresponding Author
Dr. Jai Prakash Narayan
Associate Professor, Department of Pediatrics,JLN Medical College, India

Received: 11 April, 2023 Accepted: 16 May, 2023

ABSTRACT

Introduction: The pattern and prevalence of congenital GI anomalies may vary over time or with geographical location with proportions as low as 1% to as high as 45.2%.It usually manifest in the neonatal period, with symptoms and signs of gastrointestinal tract obstruction and can be life-threatening.**Objective**: The Objective of study was to know the incidence, prevalence and pattern of GI Malformation in neonates.**Material and method**: This retrospective study was conducted in the Department of Paediatrics', Rajkiya Mahila Chikitsalaya Hospital, J. L. N. Medical College Ajmer, a tertiary care institute of Rajasthan, India from January 1991 to December 2020 over a period of 30 years.**Results**: A total of 2,65,596 live births , out of which 6725 were having congenital anomalies. The prevalence of congenital malformation was 253/10,000, Standard deviation(SD): 61.28, 95% confidence interval (CI):53.26-69.30.The prevalence of GIT anomalies was 28.50 /10,000 live births, SD: 6.43, 95% (CI): 25.98-31.02 and incidence of GI anomalies was 11.25%.. The most common GIT anomaly was Anorectal malformation including imperforated anus(20.60%) followed by Intestinal atresia (20.20%%),Oesophageal atresia with or without TEF (17.04%)..**Conclusions**:Imperforated anus was the most common GI anomaly. Early diagnosis and management can result in better outcome of newborns with congenital GI anomalies.

INTRODUCTION

Congenital malformations (CM) are morphological defects that occur in the prenatal period as a result of geneticmutation, chromosomal abnormalities and adverse intrauterine environment. These are present at birth and clinically manifest at any time in life. (1) Congenital Anomalies contribute to a significant proportion of foetal and infant mortality. (2). Worldwide report, shows that prevalence of CM that range 20-55/1000 live birth with significant variation, depending on the demographics of the study populations, the study design and method of case ascertainment. (3-9). Indian studies reported the prevalence of congenital anomalies from 160 to 430/10,000 live births [10-17].

Congenital anomalies of GIT usually manifest in the neonatal period, with symptoms and signs of gastrointestinal tract obstruction and can be life-threatening. The reported proportion of gastrointestinal tract malformations have shown a wide variation among different countries and ethnicities, with proportions as low as 1% to as high as 45.2%. Government of India launchedRastriya Bal SwasthyaKaryakaram (RBSK) for early recognition of congenital anomalies and management, but still, we are very far from ground reality. Limited data are available about the prevalence and incidence of congenital anomalies for early intervention. This study would provide baseline data regarding incidence, prevalence and pattern of congenital anomalies for better allocation of money, manpower, infrastructure development and skill training of healthcare personals.

MATERIAL AND METHODS

This retrospective study was conducted in the Department of Paediatrics', RajkiyaMahilaChikitsalaya Hospital, J. L. N. Medical College Ajmer, a tertiary care institute of Rajasthan, India from January 1991 to December 2020 over a period of 30 years. Ethical clearance and approval to conduct this study was obtained from the ethics committee of institute.

A register is maintained by residents regarding congenital anomalies in newborns. Resident doctor filled data regarding gravidity, parity of mother, type of anomalies in newborn, gestational age, birth weight, sex and symptoms of child. Total live births per month and year were recorded.All live born babies with congenital anomalies during the study period were included in this study. Still births were excluded from the study. Lesions in the mouth, pharynx and extra-GIT organs such as the liver, pancreas and gall bladder, biliary tract were not considered. All the available data werefilled in a Microsoft Excel sheet regarding gestational age, birth weight, sex of the child, type of congenital anomalies, relevant histories and analysed.

OBSERVATION AND RESULTS

A total of 2,65,596 live births were occurred during this time period, out of which 6725 were having congenital anomalies. The prevalence of congenital malformation was 253/10,000, standard deviation 61.28, 95% confidence interval (CI):53.26-69.30.The prevalence of GIT anomalies was 28.50 /10,000 live births, standard deviation 6.43, 95% Confidence interval (CI): 25.98-31.02and incidence of GI anomalies was 11.25%. GIT anomalies were diagnosed in 757 neonates; of these, 54.42% were male and 45.57% female. **(Table: 1).** Among live-born children having congenital GIT anomalies 60 % babies were delivered through normal vaginal route and 39.37% were delivered through Caesarean Section.

Table 1: Sex distribution of total and GI anomalies

	Total Anomalies	GI anomalies
Male	3572 (53.11%)	412 (54.42%)
Female	3153 (46.88%)	345 (45.57%)
Total	6752	757

Table 2:Distribution of neonates according to gestational age and sex

Gestational Age	Male	Female
<34 week	29 (7.03%)	26 (7.53%)
34-37 week	153 (37.12%)	123 (35.56%)
>37 week	230 (55.82%)	196 (56.81%)
Total	412	345

Table 3:Neonates with GI anomalies according to weight and sex

Birth weight	Male	Female
<1 kg	16 (3.88%)	14 (4.06%)
1-1.499kg	38 (9.22%)	29 (8.40%)
1.5-2.499 kg	139 (33.73%)	118 (34.20%)
>2.5 kg	219 (53.16%)	184 (53.33%)
Total	412	345

Table 4: Types of GI anomalies with sex distribution

Types of anomalies	Number	Percentage	Male	Percentage	Female	Percentage
Anorectal malformations including imperforate anus	156	20.60%	84	20.39%	72	20.86%
Ileal atresia	60	7.92%	27	6.55%	33	9.56%
Duodenal atresia	56	7.40%	26	6.31%	30	8.70%
Jejunal atresia	28	3.70%	18	4.37%	10	2.90%
Colonic atresia	9	1.19%	5	1.21%	4	1.16%
Oesophageal atresia with or without TEF	129	17.04%	79	19.17%	50	1.45%
Hirschprung disease	97	12.81%	51	12.38%	46	13.33%
Diaphragmatic hernia	70	9.25%	43	10.44%	27	7.83%
Pyloric stenosis/hypertrophic pyloric stenosis	30	3.96%	19	4.61%	11	3.19%
Omphalocele /exomphalos	26	3.43%	16	3.88%	10	2.90%
Choledochal cyst	25	3.30%	11	2.67%	14	4.06%
Meckel's diverticulum	23	3.04%	12	2.91%	11	3.19%
Gatroschsis	19	2.51%	7	1.70%	12	3.48%
Midgut volvulus and malrotation of gut	12	1.59%	5	1.21%	7	2.03%
Duplication cyst	10	1.32%	6	1.46%	4	1.16%
Enteroumbilical fistula	4	0.53%	3	0.73%	1	0.29%

Cloacal malformation	3	0.40%	0	0.00%	3	0.87%
Total GI Anomalies	757	11.26%	412	54.42%	345	45.57%

56.81 % of GIT anomalies were found in neonates of gestational age between 37 and ≤42 weeks in female. **(Table 2).GIT anomalies were** more term babies than preterm babies. **(Table 3).**Themost common GIT anomaly was Anorectal malformation including imperforated anus(20.60%)TEF fou cases followed by Intestinal atresia (20.20%),Oesophageal atresia with or without TEF (17.04%)hirschsprung disease (12.81%),Diaphragmatic hernia (9.25%), Pyloric stenosis(3.96%),Omphalocele (3.43%),Choledochal cyst (3.30%) and Gastroschisis (2.51%). **(Table 4)**

Time trends in the prevalence of congenital malformations of the gastrointestinal tract were among newbornsAjmer, Rajasthan, 1991 to 2020 as shown in table. (Table-5)

Table:-5

Year	GI anomaly	No of babies having congenital anomalies	Total live birth	Incidence of G I anomalies among congenital anomalies	PREVALENCE of GI anomalies per 10000 of live birth per year	PREVALENCE of congenital anomalies per 10000 of live birth per year
1991	22	182	4850	12.09	45.36	375.3
1992	26	187	5120	13.9	50.78	365.2
1993	23	196	5209	11.73	44.15	376.3
1994	19	184	5233	10.32	36.3	351.6
1995	17	179	5403	9.4	31.46	331.3
1996	20	169	5609	11.83	35.66	301.3
1997	17	152	5511	11.18	30.85	275.8
1998	18	167	5520	10.77	32.6	302.5
1999	23	188	5830	12.23	39.45	322.5
2000	19	193	6002	9.84	31.66	321.6
2001	20	191	6122	10.47	32.66	318.2
2002	21	183	6433	11.47	32.64	284.5
2003	19	176	6997	10.79	27.15	251.5
2004	19	156	7005	12.17	27.12	222.7
2005	23	189	6844	12.16	33.60	276.2
2006	21	178	7022	11.79	29.90	253.5
2007	27	198	8002	13.63	33.74	247.4
2008	23	199	8279	11.55	27.78	240.4
2009	27	207	8437	13.04	32.	245.3
2010	25	223	9012	11.21	27.74	247.4
2011	29	257	10334	11.28	28.06	248.7
2012	27	260	11222	10.38	24.05	231.7
2013	29	285	12894	10.17	22.49	221.03
2014	30	303	13394	9.9	22.39	226.2
2015	37	336	14980	11.01	24.69	251
2016	38	321	15800	11.83	24.05	290
2017	36	301	16798	11.96	21.43	285
2018	37	362	17986	10.22	20.57	281
2019	35	331	14356	10.57	24.38	270
2020	30	272	9392	11.02	31.94	289
Total	757	6725	265596	11.25	28.50	253

DISCUSSION

The pattern and prevalence of congenital anomalies may vary over time or with geographical location, reflecting a complex interaction of known and unknown genetic and environmental factors including socio-cultural, racial and ethnic variables. (18)

In the present study, the prevalence of congenital malformations in the newborns was 2.53 % which is comparable with the earlier studies from India, which reported incidence of 2.72% and 1.9 %(19, 20, 23). In this study incidence of GI anomalies was 11.25%. Results were similar to Basavanthappa study-12.5% (21). Ravinder K Gupta study(22), the overall incidence of congenital anomalies was 1.5%and prevalence of GIT anomalies were 41.89/10,000.Shatanik Sarkar study (23). The prevalence of GI anomalies were 33.34/10,000. The prevalence of GIT anomalies was 28.50 /10,000 live

births in this study (standard deviation 6.43, 95% Confidence interval (CI): 25.98-31.0). In our study imperforated anus was most common GI anomaly (20.60%). In Alok kumar study,the prevalence GIT anomalies were 7.21/10,000 live birth and the Congenital anomalies of smallintestine (32.62%) was the most common GIT anomalies(24).Asindi, Saad A, Study during over 6 years, the incidence was 12.40%(25). The leading malformations were imperforate anus (44.8%), TOF (24.1%) intestinal atresia (21.3%), Hirschsprung's disease (8%) and stenosis (1.7%). (21).

Male preponderance was similar to the other studies. (19, 20)

LIMITATIONS

It is a tertiary care hospital so; the prevalence may be higher than the general population in this study. Hence, the data cannot be projected to the general population, for which population-based studies are necessary. Secondly, we excluded the abortions and stillbirth.

CONCLUSION

GIT anomalies constitute significant percent of total congenital malformation and cause of neonatal mortality and morbidity. Easy diagnosis and management should be done for better the outcome. Early diagnosis and management of anomalies is strongly recommended.Further management for the disability and rehabilitation of babies should be done so that they can leave normal life.This study has highlighted the prevalence and types of GIT congenital anomalies seen in our locality.

REFERENCES

1. Sadler TW. Congenital malformations. Langman's Medical Embryology. 8th ed; 2000:95.
2. Parker SE, Mai CT, Canfield MA, Rickard R, Wang Y, Meyer RE, et al. Updated national birth prevalence estimates for selected birth defects in the United States, 2004-2006. Birth Defects Res A Clin Mol Teratol2010; 88:1008-16.
3. Egbe A, Uppu S, Lee S, Stroustrup A, Ho D, Srivastava S, et al. Congenital malformations in the newborn population: A population study and analysis of the effect of sex and prematurity. PediatrNeonatol2015; 56:25-30.
4. Yoon PW, Olney RS, Khoury MJ, Sappenfield WM, Chavez GF, Taylor D, et al. Contribution of birth defects and genetic diseases to pediatric hospitalizations. A population-based study. Arch PediatrAdolesc Med 1997; 151:1096-103.
5. Czeizel AE. The primary prevention of birth defects: Multivitamins or folic acid? Int J Med Sci 2004; 1:50-61.
6. Botto LD, Olney RS, Erickson JD. Vitamin supplements and the risk for congenital anomalies other than neural tube defects. Am J Med Genet C Semin Med Genet 2004;125C:12-21.
7. Czeizel AE. Prevention of congenital abnormalities by periconceptional multivitamin supplementation. BMJ 1993; 306:1645-8.
8. Zhang X, Li S, Wu S, Hao X, Guo S, Suzuki K, et al. Prevalence of birth defects and risk-factor analysis from a population-based survey in inner Mongolia, China. BMC Pediatr2012; 12:125.
9. Cragan JD, Khoury MJ. Effect of prenatal diagnosis on epidemiologic studies of birth defects. Epidemiology 2000; 11:695-9.
10. Aiyar RR, Agarwal JR. Observation on the newborn: A study of 10,000 consecutive live births. Indian Pediatr1969; 6:729-42.
11. Sachdeva S, Nanda S, Bhalla K, Sachdeva R. Gross congenital malformation at birth in a government hospital.Indian J Public Health 2014; 58:54-6.
12. Sarkar S, Patra C, Dasgupta MK, Nayek K, KarmakarPR.Prevalence of congenital anomalies in neonates and associatedrisk factors in a tertiary care hospital in Eastern India. J Clin Neonatol2013; 2:131-4.
13. Singh M, Sharma MK. Spectrum of congenital malformations in the newborn. Indian J Pediatr1980; 47:239-44.
14. Tibrewala NS, Pai PM. Congenital malformations in the newborn period. Indian Pediatr1974; 11:403-7.
15. Ghosh S, Bhargava SK, Butani R. Congenital malformations ina longitudinally studied birth cohort in an urban community.Indian J Med Res 1985; 82:427-33.
16. Joseph N, Subba SH, Naik VA, Mahantshetti NS, Mallapur MD. Morbidity among infants in South India: A longitudinal study. Indian J Pediatr2010; 77:456-8.
17. Kulshrestha R, Nath LM, Upadhyaya P. Congenitalmalformations in live born infants in a rural community. IndianPediatr1983; 20:45-9.
18. Birch MR, Grayson N, Sullivan EA. AIHW Cat. No. PER Birth Anomalies Series No. 1. Sydney: AIHW National Perinatal Statistics Unit; 2004. Recommendations for development of a new Australian birth anomalies system: A review of the congenital malformations and birth defects data collection.
19. Chaturvedi P, Banerjee KS. Spectrum of congenital malformations in the newborns from rural Maharashtra. Indian J Pediatr. 1989; 56:501–
20. 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; 16:159–63.
21. Basavanthappa SP, RajathPejaver, Srinivasa.Congenital malformation in newborn: in a medical college hospital in south india, Int. J. Advances in medicine.2014; 1:2.
22. Ravinder K Gupta,ArjunSingh.Pattern of Congenital anomalies in Newborn, J K Science .2009;11(1)
23. Shatanik Sarkar,ChaitaliPatra.Prevalence of Congenital Anomalies in Neonates and Associated Risk Factors in a Tertiary Care Hospital in Eastern India J Clin Neonatol. 2013; 2(3):131–134.
24. Alok kumar, KreetiSingh.Major congenital malformations of the gastrointestinal tract among the newborns in one of the English Caribbean Countries, 1993 - 2012. J clinical neonatology. 2014; 3:205-210.
25. Asindi, Saad A, AI-Daama, MohammedS.Zayed Congenital malformation of the gastrointestinal tract in Aseer region, Saudi Arabia. Saudi Medical Journal.2002 23(9):1078-82.
26. Mohanty C, Mishra OP, Das BK, Bhatia BD, Singh G. Congenital malformations in newborns: A study of 10,874 consecutive births. J Anat Soc India. 1989; 38:101–11.