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## Research Article

# A Study into the Maternal Sociodemographic Factors and Its Association with Birth Defects

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**Abstract:** A birth defect is described as a structural of functional deformity which is present since birth. Birth defects accounts for a significant cause of infant mortality and morbidity that has a formidable impact in low resource countries. The World Health Organization (WHO) gives an estimate of at least 3.3 million of under-five year children dying from serious genetic or partly genetic birth defects and 3.2 million of those who survive may be disabled for life that exert a high economic toll on those affected, their families and their communities. Several maternal factors have been implicated as causative factors of birth defects. The present observational study was conducted at Gauhati Medical College and Hospital to determine the prevalence of birth defects along with the various maternal factors associated with them. In our study we found that the prevalence of birth defects was 86.3/10000 live births. We observed that unwanted pregnancies without any antenatal check-up, maternal diabetes, PIH, fever were important factors associated with an increased incidence of birth defects. It was also observed that mothers who had not received folic acid supplementation formed a significant group of cases with birth defects. Thus proper antenatal care to prevent these maternal factors can go a long way to prevent birth disorders and thus reduce the morbidity and mortality associated with birth defects.
**Keywords:** live birth, pregnancy, morbidity, folic acid, infant mortality

## INTRODUCTION

A birth defect is defined as a structural or functional abnormality, including metabolic disorders, which are present from birth[1]. The term congenital disorder is considered to have the same meaning and the two terms are used interchangeably. It is estimated that 9 million infants (approximately 7% of all births globally) annually are born with a serious birth defect that may kill them or end upwith a lifelong disability[2]. Neural tube defects (NTD) are serious and commonest structural birth defects that affect more than 300,000 newborn Worldwide yearly.[1]Several genetic, infectious or environmental factors have been implicated in the causation of birth defects. Genetic causes of birth defects are chromosomal abnormalities, single gene defects and multifactorial disorders. The non-genetic causes are due to teratogens and constraints. Teratogens are foetal environmental factors that cause damage mostly in the embryonic phase of development from 4-10 weeks after the start of the last menstrual period. These are maternal infections eg. Toxoplasmosis, Rubella, Cytomegalo virus, Herpes Simplex and HIV/AIDS (TORCH); maternal illness eg. diabetes mellitus and epilepsy; radiation in very large doses; drugs eg. alcohol, retinoic acid, some antibiotics (tetracycline streptomycin), anti-cancer drugs (methotrexate, thalidomide), warfarin, some anti convulsants (sodiaum valproate, phenytoin), mood stabilizers (lithium); environmental pollutants eg. methyl mercury. Other risk factors for birth defects are maternal medical complications and smoking.The present study is aimed for a better understanding of the various maternal factors predetermining the occurrence of birth defects andthus aid in undertaking preventive measures.

## MATERIALS AND METHODS

The present study is an observational study undertaken at the tertiary centre of Gauhati Medical College and Hospital, Assam which was conducted over a period of 6 months from 1.04.15 to 30.09.15. The inclusion criteria was- live-born infants, foetal deaths of at least 20 weeks' gestation and pregnancy terminations of any gestational age with birth defects. The exclusion criteria included all live births, foetal deaths or abortions without any birth defect.

The ethical clearance was given by the institutional ethics society. All women with live-born infants, foetal deaths of at least 20 weeks'gestation and pregnancy terminations prenatally diagnosed birth defects were included in the study after obtaining an informed and written consent. The cases include were identified for isolated, multiple, or complex birth defects.

Maternal interviews were conducted using a standardized questionnaire and questions regarding menstrual history, past obstetric history, past history of birth defects, medical history, family history and personal history was obtained to identify the factors related to those defects.

**RESULTS AND OBSERVATION**

A total of 62 cases of birth defects were documented at GMCH during the period1.04.15 to 30.09.15. The baseline characteristics are:-

**Table 1- Baseline characteristics of the mothers**

| Variable | | Number | Frequency |
|---|---|---|---|
| Parity | Nulliparas | 40 | 64.5 |
| | Multiparas | 22 | 35.4 |
| Maternal Age | <18years | 20 | 32.2 |
| | 18-34years | 32 | 51.7 |
| | >35 years | 10 | 16.1 |
| Newborn * | Male | 29 | 48.3 |
| | Female | 31 | 51.7 |
| Birth weight | <2500g | 42 | 67.8 |
| | >2500g | 20 | 32.2 |

*2 newborns had ambiguous genitalia

In our study 64.5% of the birth defects were seen in nulliparous women while 35.4% were seen in multiparous women. Nearly 32.2% of cases of birth defects had a maternal age <18 years and 16.1% with maternal age >35 years. The rates of male and female newborn were constant at 48.3% and 51.7%. The proportion of newborns with birth weight <2500gms were 32.2% while >2500 gms was 67.8%.

**Table 2- Types of birth defects according to frequency**

| Birth defects | | Number of cases | Frequency |
|---|---|---|---|
| Neural tube defects | Anencephaly | 8 | 12.9% |
| | Spina bifida | 4 | 6.4% |
| | Encephalocele | 5 | 8% |
| | Hydrocephalous | 3 | 4.8% |
| Orofacial defects | Cleft lip and palate | 11 | 17.7% |
| | Cleft palate | 4 | 6.4% |
| | Cleft lip | 2 | 3.2% |
| Limb defects | Talipes Equinovarus | 6 | 9.6% |
| | Polydactyly | 2 | 3.2% |
| | Other limb defects | 2 | 3.2% |
| Congenital heart anomalies | | 6 | 9.7% |
| Abdominal wall defects | | 5 | 8% |
| Ambiguous genitalia | | 2 | 3.2% |
| Lethal anomaly | | 2 | 3.2% |
| Total | | 62 | 100 |

In our study we have found that most of the birth defects observed during the time period were neural tube defects(32.2%) followed by orofacial ((27.6%) and limb defects (16.1%). The commonest neural tube defect observed was anencephaly which was reported as 8(12.9%) followed by spina bifida(6.4%), encephalocele (8%) and hydrocephalous (4.8%) Among the orofacial defects the commonest was combined

cleft lip and palate. 2 (3.2%) while isolated cleft lip was the least (3.2%). As regards the cases of limb defects commonest was talipes equinovarus. The number of cases reported with anomalous genitalia was 3.2 % and lethal multiple congenital anomalies was also 3.2%.

**Table3 – Sociodemographic factors of mother and their frequency in birth defects**

| Maternal factors | Present | Absent |
|---|---|---|
| Antenatal check ups | 22(35.5%) | 40(64.5%) |
| Unwanted pregnancy | 12(19.4%) | 50(80.6%) |
| Gestational diabetes mellitus | 34(54.8%) | 28(45.2%) |
| Pregnancy induced hypertension | 10(16.1%) | 52(83.9%) |
| History of fever during pregnancy | 20(32.3%) | 42(67.7%) |
| Folic acid supplementation | 22(35.5%) | 40(64.5%) |
| History of chewing tobacco, smoking | 8(13%) | 54(87%) |
| Family history of birth defects | 10(16.1%) | 52(83.9%) |

In our study it was observed that 19.4% cases were unplanned pregnancies whereas 64.5% cases did not receive any antenatal check-ups. 54.8% cases were diagnosed as GDM at the time of delivery while hypertension was prevalent in 16.1%. Another aspect observed was that 64.5% did not receive any folic acid supplementation. Family history was positive in 16.1% of the cases in either siblings or first degree relatives.

**DISCUSSIONS**

The present observational study was conducted to study the frequency of various sociodemographic maternal factors in newborns with birth defects. The total number of deliveries in GMCH was 7595 out of which 7180 were live births. The total number of birth defects was 62. Thus the prevalence was 86.3/10000 live births. The most common birth defects was neural tube defects (32.2%) followed by orofacial ((27.6%) and limb defects (16.1%). This is similar to the prevalence rate of 84.2/10000 in 2010 reported by the BDRI (Birth Defects Registry of India)[3].

In our study we observed that 64.5% of the mothers were nulliparas whereas 35.4% of the cases were multiparas. The age distribution observed was 32.2% was less than18yrs of age and 16.1% were more than 35 years. There is a significant association between maternal age and birth defects as suggested by several studies. A study conducted by Gill SK et al in reported increased chances of birth defects at ages<20 years and >40 years. They observed an increased risks ofassociation with total anomalous pulmonary venous return, amniotic band sequence,and gastroschisis at maternal age <20yrs and several cardiac defects, esophageal atresia , hypospadias and craniosynostosis at maternal age >40 yrs[4].

The proportion of males and females was 48.3% male births and 51.7% female births in our study. It was seen that orofacial defects like cleft lips and palate had more incidences among female newborn. This is consistent with the findings of a study done by Dr. Azeez et al in Africa in which observed a female preponderance for cleft lip and palate[5].

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Another aspect observed in our study was that 67.8% of cases had a birth weight less than 2500 gms and 32.2 % had a birth weight more than 2500gmsThere was a relation between newborn birth weight and structural defects. Lowbirth weight babies (<2500 grams) were more likely to have congenitaldefects than normal birth weight babies (>2500 grams). Preterm labour and birth defects may also share other risk factors such as maternal fever, maternal hypertension and different maternal infections. The risk of birth defects had been observed to significantly increase in premature infants by a study conducted by Khaury *et al*.[6].

Another aspect observed in our study was that 19.4 % of the pregnancies were unplanned and gave history of ingestion of abortifacients. These pregnancies later had birth defects which may be because of the drugs consumed as abortifacients. Again only 35.5% cases had received antenatal check up. Most of them (64.5%) did not receive any antenatal check up nor underwent any ultrasonography.

54.8% of the cases of birth defect were diagnosed as gestional diabetes at the time of delivery and 16.1% had pregnancy induced hypertension.

A study carried out by researchers from Newcastle University, the Regional Maternity Survey Office in Newcastle, and the South Tees NHS Trust found that women who had worse blood sugar control at around the time of conception were at increased risk of having babies with birth defects[7].

Another study conducted by Alissa R. Van Zutphen *et al* in 1997-2009 showed an association between maternal hypertension and birth defects mainly hypospadias[8].

Another Sociodemographic factor foundin our study was that mothers who did not take folic acid supplementation tablets during pregnancy were 64.5% and showed an increase incidence of neural tube defects. Various studies have shown the association between preconception folic acid to a decreased rate of neural tube defects[9-11]. 16.1% cases in our study gave a positive family history of birth defects which holds relevance considering the genetic basis of congenital anomalies.

## CONCLUSSION

In the present study we have found that the prevalence of birth defects in our institute was 86.3/10000 live and the most common birth defects was neural tube defects (32.2%) followed by orofacial ((27.6%) and limb defects (16.1%). We have observed that several maternal factors such as unwanted pregnancies, maternal diabetes, PIH, fever had an increased frequency among birth defects. It was also observed that mothers who had not received folic acid supplementation formed a significant group of cases with birth defects. Thus it is seen that several maternal factors are related to the incidences of birth defects. Proper antenatal assessment and care along with prevention of maternal diseases like diabetes, hypertension, infections etc can go a long way in reducing the incidences of birth defects and its associated morbidity and mortality

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