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ANALYSIS OF NEONATES WITH MAJOR CONGENITAL MALFORMATIONS BORN TO MOTHERS AGE 20–25 YEARS

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Conflicts of Interest: Nil
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Abstract:

Aim: To study the effect of birth weight and maturity on outcome of neonates with major congenital malformations born to mothers age group 20yr to 25 yrs. in neonatal unit of Mahatma Gandhi Memorial Government Hospital (MGMGH) attached to KAPVGMC, Trichy.

Method: A Prospective Descriptive study involving all live births with congenital malformations delivered to mothers aged 20-25 years in MGMGH, Trichy during a 2-year period between August 2011 to July 2013 was carried out.

Results: Total of 87 neonates was included in the study and was analyzed by grouping according to birth weight and maturity. Mortality significantly higher in preterm and lower birth weights.

Conclusion: Birth Weight & Maturity Are Significant Determinants in Outcomes of Neonates Born with Congenital Malformations to Mothers in Age Group 20 -25 Years

Keywords: Congenital malformation, neonate, birth weight, preterm, folic acid, maternal age, consanguinity

Introduction

India accounts for 1 in 4 of global newborn deaths. Congenital malformations are the 5th leading cause and accounts for ~10 % neonatal mortality and has long lasting morbidity. Prenatal detection and prevention form the key step in the effective management and reduction of the problem burden. Though the World Health Assembly 2010 adopted a resolution, it still remains under prioritized in India, which even lacks a national surveillance programme and registry.

Many Indian women irrespective geography, caste-class-religious- social variations deliver most of their issues in the age group 20-25 years. This age group innately negates the very young teens and elderly mothers and the primi and the multiparous women in whom congenital, both chromosomal and non-chromosomal malformations are common, leading us to choose this cohort for our study. [1,2]

Material and Methods:

In this study between August 2011 and July 2013, a period of two years we prospectively included all newborns diagnosed after screening and confirmation with appropriate imaging modalities with major congenital malformations born to mothers of the age group 20-25 years admitted to the neonatal unit of Mahatma Gandhi Memorial Government Hospital, Trichy. The neonates were grouped, studied and resultant data tabulated:

1. Based on Birth Weight- Classified as Appropriate for Gestational Age (AGA) and Small for Gestational Age – (SGA)

2. Based on Maturity Classified as Pre term (PT), Late Pre term-(LPT), and Term (T).

They were followed up for a week and the outcome was analyzed. The exclusion criteria were all extramural deliveries and neonates whose outcome not known /lost to follow up.

Results:

During the study period of a total 16672 live born, 232 born with congenital malformations. Total neonates born to mothers aged 20 to 25 years were 91, 4 excluded and hence n = 87.

The data was tabulated and analyzed on the basis of maternal age, parity, previous abortion, consanguinity, maternal illness, IFA consumption and system involved. The results were as follows. Most mothers were of age 22 years (25.3%) and less than 15% were of age less than 22 years. 58 of the 87 malformed neonates (66.6%) were first born, to primigravidae mothers. History of previous abortion was present in only 6 (6.9%) of the mothers. More than 75% (66 of 87) of the neonates with congenital malformations were born out of consanguineous relationships. About 20% of the mothers had illness such as DM, PIH. Only 23 out of the 87 mothers (26%) had taken IFA supplementation regularly as advised antenatally.

Table 1:

MATERNAL AGE (yrs)		NUMBER	PERCENTAGE (%)
	20	9	10.3
	21	4	4.6
	22	22	25.3
	23	16	18.4
	24	20	23
	25	16	18.4
PARITY			
	PRIMI	58	66.6
	2	22	25.3
	>2	7	8.1
ABORTION			
	Absent	81	93.1
	Present	6	6.9
CONSANGUINITY			
	No	66	75.9
	Yes	21	24.1
MATERNAL ILLNESS			
	No	69	79.3
	Yes	18	20.7
IFA			
	Regular	23	26.4
	Irregular	61	70.1
	Not taken	3	3.5

On tabulation and analysis of the data with respect to systemic involvement, the results were as follows.

The GIT was the most common system involved, 24 of 87 neonates (27.6%) followed by CNS, 20 neonates (23.1%). Cleft lip and palate (13) were the commonest GIT malformation. Also 6 neonates had defects of the abdominal wall. Neural tube defects were detected in 18 of the 20 CNS malformations with meningomyelocele being the commonest (16). In CVS it was septal defects. Equino varix (CTEV) of the foot was the commonest musculoskeletal malformation. Significantly all neonates (5) with respiratory system involvement had diaphragmatic hernia and expired in the neonatal period.

Very few (5%) neonates had syndromic or multiple malformations.

Table 2:

SYSTEM			
	GIT	24	27.6
	CNS	20	23.1
	GUT	14	16.1
	MSK	10	11.5
	CVS	9	10.3
	RS	5	5.7
	SYN	4	4.6
	MULTIPLE	1	1.1

Further we tabulated and analyzed on the basis of birth weight and maturity.

Based on Birth Weight

- Appropriate for Gestational Age -AGA 61
- Small for Gestational Age - SGA 26

Based on Maturity

- Pre term -PT 7
- Late Pre term- LPT 11
- Term - T 69

In the AGA group the average maternal age is 23.06 years with mode 22 years as compared to the SGA group with average of 22.6 years with mode 24 years. Both groups reported a similar about only 25% were taking regular prescribed folic acid supplementation therapy. 5 mothers of AGA and 0 of SGA gave history of previous abortions.13 out of 61 AGA (20%) only as against 8 out of 26 SGA (30%) were borne through consanguineous union. AGA group mothers with comorbid illness Gestation Diabetics -5, Pregnancy induced Hypertension 3 while SGA group 0 and 3 respectively. Very few SGA neonates with malformations were detected antenatally (2/26;7%). In AGA group, the detection rate is15%.

The mode of delivery was as follows. AGA - Normal 36 (59%), Instrumental 11 (18%), Caesarean 14 (23%). SGA- Normal 11 (42%), Instrumental 4 (16%), Caesarean 11 (42%). The AGA newborns had sex ratio of M:F =1:1, with average Birth Weight of 2.75 kg versus significantly different SGA newborns M: F=1.5:1 and average Birth Weight of 2.14 kg. 8 (13%) and 6 (10%) of 61 AGA were late preterm and preterm as for 3(12%) and 1(3%) of 26 SGA. The system- wise distribution of malformation was similar in both groups. Gastrointestinal followed by central nervous system malformations were the commonest in both groups, being 20 and 14 in AGA and 4 and 4 in SGA respectively. The mortality noted was marginally higher in SGA neonates at 19% versus 16% in AGA.

When the data was studied based on maturity the following results emerged. Maternal age Mode and average for PT, LPT and T were 22 years and 22.14 years, 24 years and 23.27 years and 24 years and 22.91 respectively. Multiparity was more in term neonates at 20 of 69. Regular folic acid supplementation was seen in mothers of 24 % in term and only 17% before term. Consanguinity noted as follows: 1 in PT, 3 in LPT and 17 in T. History of previous miscarriage recorded was nil in LPT, while 2 and 3 in PT and T respectively. Antenatal diagnosis was only one each in PT and LPT while 7 were detected in T neonates. All 11 mothers with gestational diabetes and hypertension delivered at term.

The mode of delivery was mostly normal before term with 3 caesarean and 15 normal (83%); in term being Normal 35(51%), Instrumental 13 (19%), Caesarean 21 (30%). Sex ratio was M:F= 1:1 uniformly. With respect to birth weight there was a significant variability with average ranging for PT 1.3 kg, LPT 1.9 kg and T 2.8 kg. The system- wise

distribution of malformation was similar in all groups. Mortality data yielded significant findings. 4 out of 7 preterm, a staggering 57% expired. Of the 11 late preterm 3 died (27%). Only 8 of 69, mere 12% term newborns did not survive.

Discussion

Congenital malformations (CM) used often interchangeably with birth defect (BA), refers to any structural or functional abnormality, whether genetic or not, which is present at birth. There are 2 types of congenital malformations: Major and minor. Major congenital developmental disturbances are defined as structural defects of the body and/or organs that impair viability and require intervention. Minor morphogenetic errors are small structural developmental disturbances that do not impair viability and do not need to be treated. (3,4)

The issue of congenital malformations has not been prioritized till lately in India as a public health problem since it was considered rare and causing high mortality of affected infants. Another belief that led to under-prioritization is that birth defect prevention is not possible through low-cost primary care strategies.

However, statistics noted that quarter of global neonatal deaths occur in India, congenital anomalies constituted the fifth largest cause, being responsible for one-tenth of neonatal deaths in the year 2010.The true magnitude of the problem due to lack of a national birth defects surveillance can only be estimated through meta-analysis to about 5,00,000 affected births in India each year.

Many of these conditions can be prevented or mitigated by interventions in the preconception, intra-conception and antenatal periods. Strategies preventing congenital anomaly birth also target common risk factors for most adverse pregnancy outcomes. Hence, they reduce reproductive mishaps and improve pregnancy outcome. (1)

The impacts of maternal age on birth defects have been long investigated. The etiology of birth defects, especially non chromosomal, has been widely studied but is not yet fully clarified. (2)

For all malformations prevalence across the age distribution was J shaped, women less than 20 years old have an intermediate prevalence, and women more than 39 years old having the highest prevalence. (5)

Studies have noted that teenage mothers belong to a lower socioeconomic group, are less educated, unplanned pregnancies, sometimes unmarried, and are less likely to have early prenatal care and antenatal care and result in preterm deliveries. (4) This might explain the findings.

With regards to non-chromosomal studies suggest maternal inherent characteristics, environmental and behaviors components are involved. (2) The distribution of prevalence of non-chromosomal malformations was U shaped across maternal age from teenagers to those above 35 years. (5) Women who were 25 years of age or older at delivery had significantly and progressively greater risk of having fetuses with non-chromosomal malformations compared with women 20–24 years old. (6) Young maternal age (25 years old) was associated with a reduced risk albeit protective effect of CHD, though they were more likely to have infants with polydactyly. Other defects have a higher prevalence among younger mothers are abdominal wall, orofacial and neural tube defects. (2,4) Our findings are in consonance with these reports.

The prevalence of Chromosomal Abnormalities increased as maternal age increased, with strong association with multiple anomalies. A study in China reported the presence of congenital anomalies due to chromosomal abnormalities in age 20-24 yrs (12%) to be less than half of age 25-35 yr (~25%) and one third age 35-47 yr (35%). (7,8) In a study conducted in Korea, for every year of age increase, the odds ratio increased by 1.18 times for T21, by 1.18 times for T18, and by 1.16 times for fetal aneuploidies. (7) In our study also the presence of syndromic and multiple malformations was 5 out of 87 (~5%).

Studies indicate that the impacts of parity were independent by maternal age. The risk of delivering an infant with equinovarus, polydactyly and CHD including TOF reduces after the first born. (2) Among non-chromosomal cases, a similar U-shaped prevalence curve was seen for parity between firstborn and second-born infants and multiparity. (5) In the present study 66% of the mothers were primigravidae seeming to reinforce the earlier findings.

Overall anomalies of the central nervous system were most frequently reported, followed by anomalies of the musculoskeletal system. Cardiovascular system anomalies had the lowest birth prevalence across both hospital and community settings. (1)

In our study GIT involvement was the commonest followed by CNS. Cleft lip and palate were the commonest GIT malformation. Significantly 6 neonates had defects of the abdominal wall.

That young maternal age is a risk factor for gastroschisis has been reported by several investigators. (5)

Neural tube defects that can be prevented by folic acid supplements were detected in 18 of the 20 CNS malformations with meningomyelocele being the commonest. Significantly only about 26% of the mothers reported taking IFA regularly in our study.

In this study significantly all neonates with respiratory system involvement had diaphragmatic hernia and expired in the neonatal period. Study by Chaudhary et al on CDH report survival of 60% with neonates more than 37 weeks and birth weight more than 2.7 kg. (9)

In our study of the preterm, a staggering 57% expired. Comparing Birth Weights overall average of dead was 2.12 kg, survivors 2.69 kg. When compounding the birth weight along with maturity between the dead and survivors, there was obvious significance.

Our results suggest that mortality and maturity play a decisive role in the survival of malformed neonates and is in lines with findings with mortality in normal neonates where mortality rate were significantly higher among preterm and underweight neonates. (10,11,12)

Limitation:

1. This is a hospital-based study, thus the prevalence calculated may not reflect the exact prevalence of the community.

2. This study did not include still births. Literature suggests that up to 50% of still births may have chromosomal abnormalities.

3. Exact reliable data regarding sexuality, marriage and childbirth of Indian women is not available.

Various figures available -

NFHS 2015-16 age of first sex 15-19 yrs.,

Census 2011 marriage age 21.2 yrs, married age less than 18 yrs. 3.7%, 50 % rural females marry between 18- 20 years, 30% urban.

Statistics 2013 Median age at first pregnancy among married women 20.8 yrs., mean age at first birth was 19.90 in 2012

4. There are no studies to compare the effect of birth weight and maturity on outcomes of neonates with congenital malformations.

Conclusion:

Birth weight and maturity are the significant determinants in the outcome of neonates born to mothers in the age group 0f 20-25 years. The most common system involved in the neonates in the specific age group of mothers is gastrointestinal system. The issue of congenital malformations has not been prioritized till lately in India as a public health problem since it was considered rare and causing high mortality of affected infants. Now the stress to be given for prevention and early detection and management of identified anomalies.

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