

ORIGINAL ARTICLE

RELATIONSHIP OF SELECTED PRENATAL FACTORS TO PREGNANCY OUTCOME AND CONGENITAL ANOMALIES

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Objective: The aim of this paper is to explore the relationship of various selected prenatal circumstances to pregnancy outcome in particular reference to congenital anomalies. **Method:** It was a cross-sectional analytical study and conducted at unit 'A' of the Department of Obs/Gyn, Postgraduate Medical Institute, Lady Reading Hospital, Peshawar, from January to December 2009. The analysis included data on all women having pregnancies with adverse outcome and various congenital anomalies during the study period 1st January to 31st December 2009. A hospital-based maternal health data was used from history records and direct interviewing of the patients subject to their availability and information were recorded for all the cases on structured proformae. The data included demographic details, social environment, consanguinity, ovulation induction, drug intake during early pregnancy, exposure to radiation, infection during early pregnancy, complications of pregnancy, prematurity, obstetrical variables, congenital anomalies and materno-foetal morbidity and mortality. Findings at prenatal visits and data regarding prior pregnancies and morbidity among other children are also abstracted from obstetrical and medical charts. In case of the newborn, the neonatal chart abstract has proved to be a more complete source of information on congenital anomalies. The data was entered on SPSS-10 and the analysis included simple proportions and rates. **Results:** Out of a total of 5,082 deliveries 163 (3.2%) were complicated by various congenital anomalies with preponderance of neural tube defects notably the hydrocephalous (33.4%) and Anencephaly (29.2%). Most of the mothers were un-booked and uneducated (90%). Eighty-eight (54%) women were in their twenties, thirty (22%) with ≥ 35 years of age and only 9% in the teenage group. About 36% of the deliveries in the study population are among primigravida. Four cases (3.1%) had history of exposure to some non-specific radiation due to the locality of their house. Almost 21% of couples had cousin marriage. Regarding drug intake no specific link could be demonstrated as 45% took nothing while the remaining took the multivitamins and tonics only. Only 4 cases (2.5%) had taken assisted conception in the form of clomiphene citrate. About 34 per cent of the multigravida with antepartum bleeding reported that their last prior pregnancy ended in a foetal death or prematurely born infant. The corresponding figure for all multigravida women was 21 per cent. However, prior pregnancy history does not explain the more adverse risk associated with APB. **Conclusion:** These results together provide information to physicians and genetic counsellors to realise contribution of congenital abnormalities and setting priorities of screening individual cases.

Keywords: Outcome, Prenatal, Pregnancy, Foetal, Counselling

INTRODUCTION

The desired and expected outcome of every wanted pregnancy is a normal, functioning infant with a good intellectual potential. Fulfilment of this hope depends on numerous hereditary and environmental factors.^{1,2} Congenital anomalies are evident in 2% to 3% of all live births, but this number increases to 6% by five years of age when more anomalies are diagnosed.³

Recent research has indicated the importance of various prenatal circumstances and pregnancy outcome.^{4,5} The present paper represents an exploration for possible relationships between a variety of prenatal circumstances and pregnancy outcome and congenital anomalies among the fetuses and neonate.⁶ Briefly, the primary target of the study is to develop leads to some of the biological and environmental factors that are influencing foetal loss, mortality in neonates, prematurity, congenital anomalies, and other morbidity

among the new born. An associated objective is to identify, for public health program purposes, the groups of women representing high risks for congenital anomalies & pregnancy loss. It is believed that the results will enable identification for public health action of groups of women who represent high risks. The present study was performed to determine the relevance and risk factors of congenital anomalies during the first 24 hours of life. Early recognition of congenital anomalies on one side is important for planning care, because for some congenital anomalies such as tracheo-oesophageal fistula, diaphragmatic hernia, choanal atresia and intestinal obstruction immediate medical and surgical therapies are essential for survival.

PATIENTS AND METHOD

The total study population consists of pregnant women with congenital anomalies in the foetus and neonate

delivered at Gynae 'A' unit between 1st Jan-31st Dec 2009.

Variables of concern include age of mother, parity, prior pregnancy history, maternal morbidity in preconception and prenatal periods, and other medical disorders in the prenatal period, demographic details, social environment, consanguinity, ovulation induction, drug intake during early pregnancy, exposure to radiation, infection during early pregnancy, complications of pregnancy, prematurity, general obstetrical variables, congenital anomalies and materno-foetal morbidity and mortality, prior pregnancy experience in relation to foetal loss. Past medical and surgical conditions and difficulties during prior pregnancies reported by the mother to the obstetrician at the first prenatal visit are also recorded. These conditions are systematically abstracted from the chart entries for inclusion in the study.

All above information were derived primarily from the hospital-based maternal health data on history records and direct interviewing of the patients subject to their availability along with the reports of available medical charts for maternal morbidity. This information was recorded for all the cases on structured proformae. It covered the period three months prior to last menstrual period (LMP) and 0-11, 12-27 weeks, and 28 weeks or later following the LMP for the mother. Also, the observations being reported here relate to women who were 19-40 years of age at their LMP and who had only single births.

In the present study, the emphasis is on looking for broad relationships between maternal factors and pregnancy loss and congenital anomalies.

No autopsies were obtained for the foetal deaths. In view of this, data on congenital anomalies among foetal deaths are presumed to have a low order of completeness and accuracy.

RESULTS

There were a total of 5084 deliveries during the study period. The first approach taken to the data was on the broadest possible basis. About one in six pregnancies under medical care ended in a loss or disability; 12% in a foetal death, 28% in loss before 24 weeks of gestation, 2% in a neonatal death, 1.4% in a surviving child who had a congenital anomaly, and another 10.0% in a low-birth weight child with no such anomaly and 163 (3.2%) were complicated by congenital anomalies.

Table-1 shows the type and frequency of various congenital anomalies with preponderance of neural tube defects notably the hydrocephalous. Most of them were un-booked and uneducated (90%). Eighty-eight (54%) women were in there twenties, thirty (22%) with ≥ 35 years of age and only 9% in the teenage group. Another point of interest that about two third of the anomalies occurred in women of gravity 4 or less, of

while 36% were primigravida. Four cases (3.1%) had history of exposure to some non-specific radiation due to the locality of there house while 30% of women with congenital anomalies suffered from obesity. Almost 21% of couples had inter-cousin marriage. Regarding drug intake no specific link could be demonstrated as 45% took nothing while the remaining took the multivitamins and tonics only. Only 4 cases (2.5%) have taken assisted conception in the form of clomiphene citrate only. Antepartum haemorrhage occurred in 12.3% cases on the whole while 35% cases of intrauterine deaths mentioned above were complicated by intermittent vaginal bleeding throughout pregnancy.

Table-1: Distribution of various easily identifiable congenital anomalies (CA)

Congenital anomalies	No.	%
Hydrocephalous	26	33.4
Anencephaly	23	29.2
Hydrops foetalis	9	12.4
Spina bifida	6	7.6
Meningocele	3	3.8
Microcephaly	2	2.6
Spina bifida and hydrocephalous	1	1.3
Spina bifida and meningocele	1	1.3
Anencephaly with Echogenic kidneys	1	1.3
Ambiguous genitalia with telipes Equinovarus	1	1.3
Ambiguous genitalia with absent anterior abdominal wall	1	1.3
Cleft lip	1	1.3
Cleft palate	1	1.3
Cystic hygroma/webbed neck	1	1.3
Esophageal atresia	1	1.3
Unilateral Hydronephrosis	1	1.3
Osteogenesis imperfect	1	1.3
Deformed left hand and foot	1	1.3
Imperforated anus	1	1.3
Short limbs	1	1.3

Table-2 expands this information to cover pregnancy loss and congenital anomaly among the live born. It will be noted that 43.5 percent of the pregnancies affected by congenital anomalies ended in a low birth weight infant (2,500 gm or less). The third column of Table-2 gives the rates of occurrence of these events among pregnancies or live births that were at risk for the loss or congenital anomaly. Thus the rate of low birth weights appears in the conventional manner that is as a ratio between the number of children weighing 2,500 gm or less at birth and all live births (435/1,000).

To some extent the categories of neonatal deaths, premature births and congenital anomalies refer to the same children. Table-3 gives the relationship between low births weight and the diagnosis of a significant congenital anomaly. The likelihood that neonates with birth weights of 2,500 gm or less will be found to have such an anomaly is more than twice the rate for the other neonates.

Regarding influence of prior pregnancy history about 7% of them had prior history of congenital abnormality, 30% of women with foetal

deaths had history of previous foetal death and 40% of women with low birth weight had history of prior low birth weight babies while 35% of women with premature babies had previous premature babies.

Table-2: Foetal/Neonatal Loss, Prematurity and live born with Congenital Anomalies-Distribution and Rates (Single Deliveries)

Loss and Disability	No.	%	Rate/1,000 at Risk
Total Pregnancies	5084		
Pre-viable pregnancies	1431	28.0	
Preterm births	111	2.18	
Foetal Deaths	25	15.3	153.3
Below 24 weeks	18	11.0	110.4
≥24 weeks	7	4.3	31.0
Alive births	138	85	----
Neonatal Deaths	20	14.5	145
*Low birth weight	60	43.5	435
†Babies with congenital anomalies	163	100	

*Live births of 2,500 g or less birth weight. Births with unknown birth weight (under 1% of total) are not distributed.

†Live born children with one or more severe or significant congenital anomalies.

Table -3: Relationship between Birth Weigh and Congenital Anomalies (Single Live Births)

Anomaly	Total No (%)	2500 gm or less No. (%)	Over 2500 gm No. (%)
Total	163 (100)	60 (100)	103 (100)
'S' Anomaly	46 (28.2)	25 (42.0)	21 (20.0)
No 'S' Anomaly	117 (71.8)	35 (58.0)	82 (80.0)

DISCUSSION

Data for pregnancies occurring in this study have been examined for relationships between certain maternal conditions and pregnancy outcome. From the beginning of the study it was considered desirable to use this well-defined group to clarify analytical approaches and develop leads that would later be worth exploitation on the basis of the full set of data. It is recognized, however, that this can not be pressed too far in view of the small numbers of cases available but strong relationships were expected to emerge and if some of these could be identified the preliminary effort would be justified.⁷ Congenital anomalies are one of the major causes of pregnancy losses, stillbirths/neonatal deaths & physical defects and disabilities all over the world. Congenital anomalies can be separated into those that represent a single primary defect in development and those that represent a multiple malformation syndrome. For most of single primary defect the aetiology is unknown, however most are explained on the basis of multi-factorial inheritance. Multiple malformation syndromes are caused by chromosomal abnormalities, by teratogens and by single gene defects inherited in Mendelian patterns.⁵ This possibility is an important opportunity that may assist for the search for conditions that may explain a significant segment of pregnancy loss and disorders among the offspring.

Table-1 shows early foetal loss before viability due to significant pathology while those with prematurity may be those who came to attention late.⁸

Most of the congenital anomalies were neural tube defects notably the hydrocephalous. Almost all of the hydrocephalous were due to non-immune causes.⁹⁻¹² Cleft lip and palate accrued in 2.6% of cases which somewhat correlates with other studies.^{13,14}

Three findings are of particular significance in assessing the magnitude and in searching for correlates of loss and disability related to pregnancy outcome.

- Regarding the pattern of foetal, neonatal losses, congenital anomalies, low birth weight suggests that among pregnancies that become known, the size of the problem of suboptimal pregnancy outcome is large no matter which type of pregnancy loss or disability one looks at.
- There is a strong relationship between prior pregnancy history and outcome of the current pregnancy. The value of the current observations is that they demonstrate the magnitude of the loss involved and the basic repetitiveness of the type of loss and disability from one pregnancy to the next.
- Antepartum bleeding during the period 0-11 weeks post-LMP is associated with a very high foetal loss rate later in pregnancy. Also, there is a suggestion that among the live born the risk of low birth weight, significant anomalies, and neonatal mortality is increased among women with antepartum bleeding. Prior pregnancy history does not explain the higher risk among these women. The associations described are consistent with the results reported by others.¹⁵ Threatened miscarriage in the first trimester is associated with increased incidence of adverse maternal and perinatal outcome.¹⁶

Regarding the type of loss or disability incurred it is apparent that if the current pregnancy was preceded at any time by a premature live birth or by a foetal death, the tendency for the repetition of same abnormality was more in index pregnancy as compared to the other type of abnormality. In other words, there was a tendency for successive pregnancies to repeat themselves. Furthermore, there is some suggestion that among live births preceded by one or more premature births, the risk was comparatively high not only for low birth weight but for a significant congenital anomaly.¹⁷⁻¹⁹

We found an overall increased risk of congenital anomalies in women who are obese and women who are underweight compared with women of recommended weight. It may be associated with an increased risk of a range.²⁰⁻²² Further studies are needed to confirm whether maternal overweight is also implicated. Women should be made aware of these risks

and supported to optimise their weight before pregnancy.

As mentioned previously, maternal conditions for which medical care was received during the three-month period prior to LMP and during the interval 0-11 weeks following LMP have been selected for the current analysis. There has been considerable speculation about the significance of morbidity during the first few weeks of pregnancy ever since Gregg's observation about the deleterious effect of rubella on pregnancy outcome.

The thalidomide episode has reinforced the conviction that in the early weeks of gestation the foetus is peculiarly sensitive to teratogenic agents. But then it is recognised that restrictions exist in the present search for associations between morbidity during these two periods and pregnancy loss-disability. Among the more important are the facts that intervening variables cannot be fully considered and that for the most part only very broad groupings of conditions can be used because of the small size of the pregnancy cohort. These circumstances could lead to a spurious association or to a blurring or elimination of a correlation. Later a more intensive re-examination of the relevance of maternal morbidity to the problem of pregnancy loss should be carried out based on about two and a half times the number of pregnancies under study here and other variables will be introduced. By far the highest risk group consisted of women who received medical care for ante partum bleeding (APB) during the period 0-11 weeks post-LMP. Included are many different degrees of bleeding as indicated by the terms, 'staining', 'haemorrhage', and 'bleeding'. Also, frequently the term appears just before the woman has a miscarriage and may in some cases be the first indication that the pregnancy was terminating.

It has already been demonstrated that foetal loss in the current pregnancy is highly associated with whether the last prior pregnancy ended in a foetal death. Women with prior foetal death are at high risk for subsequent pregnancy loss and recurrent foetal death, with fewer than 25% of pregnancies resulting in surviving infants. These data underscore the need for additional research into the patho-physiology and prevention of recurrent foetal death.²³

The reasons of inconsistency between our results and other studies are probably as bellow: Some of the congenital anomalies are not diagnosed at birth and may occur later in the life, therapeutic advances, application of appropriate preconception care, adequate number of geneticists and prenatal diagnosis program. Also this inconsistency might be explained by diagnosis of both minor and major congenital anomalies in all systems, the large number of cases and the different sex ratio between male and female patients. Moreover the possible role of various factors such as different geographical distribution, ethnic, different habitual diet

and socioeconomic differences must not be disregarded.^{24,25} First of all there are different settings between our study's population and other studies' concerning genetic factors, geographical area of settlement, socioeconomic status, maternal nutritional status and habits, prenatal health care services and a large number of environmental and chemical factors which could not be measured and study of each of these factors necessitated performing at least another study. Secondly the extent of prenatal diagnosis and medical termination of pregnancies are limited in our hospitals in comparison with other countries. Ultimately many referral cases have been admitted in these teaching general hospitals which might overestimate our figures. As expected, congenital anomalies of internal organs (e.g. digestive system, heart and circulatory system, urinary system and internal genital organs) has been undetected due to invisible nature of these systems or because of asymptomatic neonates in particular during the first 24 hours of life. As in our study, other studies have shown significant relationship between congenital anomalies and birth weight.²⁶ Moreover some congenital anomalies are functional or developmental, so they are not detectable on physical examination especially during the first 24 hours of life.²⁷ Thus monitoring of growth and development of newborns in serial follow up visits helps not only to determine the actual prevalence rate of CA, but also to offer on time medical care, treatments or educational services.^{28,29}

CONCLUSION

We suggest a possible role of various factors such as different geographical may influence dissimilarities between present study and other population. Also the necessity of particular attention and emphasize on special screening program that helps to identify early stages of genetic and congenital malformation. These results together provide information to physicians and genetic counselors to realize contribution of congenital abnormalities and setting priorities of screening individual cases.

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