

Factors Causing Intrauterine Growth Retardation

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ABSTRACT

A case control study was conducted in Bahrain to determine the factors that cause intrauterine growth retardation. The study was carried out through a period of eleven months, starting July 1987. A questionnaire form was designed and coded. Two hundred consecutive cases of babies with birth weight below tenth percentile of gestational age and two hundred control babies of normal birth weight were born during the same period in the government maternity hospital. Data were collected by interviewing the mothers during their hospitalization and from their case records. The factors studied were age, height, weight of the mother, parity, complications during pregnancy, previous obstetric history, the socio-economic status and fetal outcome. It was found that younger mothers give birth to lighter babies than older ones, hypertension or pre-eclampsia was much more common in the study group compared to the control, the majority of cases of intrauterine growth retardation in Bahrain were found among the low socio-economic class and the illiterate. A higher incidence of previous abortion and previous abnormal babies were found among the study group.

Intrauterine growth retardation IUGR is associated with significant perinatal morbidity and mortality, with long-term problems of growth, behavioural and neurological development¹.

The IUGR is defined as birth weight less than the 10th percentile for gestational age for infants born in the community concerned^{2,3}.

Growth-retarded neonates are at risk of perinatal asphyxia and associated complications, including perinatal death, hypothermia, hypoglycaemia, metabolic acidosis, seizures and necrotizing enterocolitis, more than their normally grown counterparts. Long-

term effects of neurological, intellectual and behavioural performance have been documented⁴.

An important objective of antenatal care is the identification of babies who may be small for gestational age (SGA) early enough to be able to influence the outcome of the pregnancy, because SGA is associated with 8-10 fold increase in the risk of perinatal mortality than the normally formed infants⁵.

Low birth weight is a common problem all over the world. WHO reported it on a global scale in 1979, the incidence of low birth weight was 17% of all births⁴.

IUGR is associated with several general factors, such as recurrent abortion, pre-term delivery, perinatal death, and history of IUGR.

The maternal factors, which may be associated with IUGR include medical problems of hypertension, pre-eclampsia, renal disease, urinary tract infections, cardio-pulmonary disease, anaemia and haemoglobinopathies (e.g. sickle-cell disease), low pregnancy weight and low weight gain during pregnancy.

The obstetric complications of antepartum haemorrhage, pre or post-term labour, multiple gestation may also affect the infant birth weight.

The objective of this study is to determine the factors affecting the birth weight in Bahrain.

METHODS

The study was conducted on the first two hundred consecutive mothers who delivered live babies below the tenth percentile for gestational age in Bahrain

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during 1987. Data were compared with a control group consisting of two hundred consecutive live deliveries with normal birth weight during the same period.

Cases of multiple pregnancy, intrauterine death and fetal malformation were excluded from the study.

All women in the study and control group were certain about the date of their last menstruation, those who were not certain were excluded from the study. All women in the study attended the Booking Clinic during the first trimester.

Ultrasound examination is not part of the routine investigations performed at the booking visit, it is carried out only when there is a discrepancy between the gestational dates and the uterine size.

All mothers in the study were interviewed in the hospital during the post-natal period and data were collected from the medical records of mothers and babies. Questionnaire forms were designed (Figures 1 and 2), completed, coded and statistical analysis was made using SPSS programme.

RESULTS AND DISCUSSION

The previous obstetric history obtained from the study group as well as the control is illustrated in Table 1.

TABLE 1
Previous Obstetric History
Among Cases and Controls

	Cases		Controls	
	No.	%	No.	%
Miscarriages	27	13.5	17	8.5
Low Birth Weight	19	9.5	8	4.0
Stillbirths	11	5.5	5	2.5
Abnormal Babies	9	4.5	1	0.5
Neonatal Deaths	4	2.0	1	0.5
Normal	130	68.0	168	84.0
Total	200	100	200	100

It demonstrates that 27 cases had one or more miscarriages (17 in the control group). Nineteen cases had low birth weight (8 in the control group).

Eleven cases had history of congenitally abnormal babies (5 in the control group). Four cases had neonatal death (1 in the control group).

In this study, the history of previous miscarriages was the most frequent observation, it occurred in 13.5% of the study group.

Patterson⁶ and Scott⁷ showed that stronger predictor of IUGR is the history of previous growth retarded baby, even if a pre-disposing factor of pre-eclampsia was present in the first pregnancy but not the second. In their study the frequency of recurrence was 25-30%.

The complications which occurred during pregnancy in this study are illustrated in Table 2. Hypertension or pre-eclampsia was a complication of the pregnancy in thirty two cases of the study group compared to three in the control group.

TABLE 2
Complications During Pregnancy

	Cases		Controls	
	No.	%	No.	%
Hypertension or Pre-eclampsia	32	16.0	3	1.5
Diabetes	54	27.0	9	4.5
Antepartum Haemorrhage	13	6.5	2	1.0
Anaemia	16	8.0	8	4.0
Heart or lung disease	14	7.0	2	1.0
Renal Disease	3	1.5	1	0.5
Normal	68	34.0	175	87.5
Total	200	100	200	100

In fifty four cases of the study group, the pregnancy was complicated by diabetes; five cases were juvenile-onset diabetes, twenty four had gestational diabetes and twenty six had an established diabetes mellitus. In the control, five patients had an established diabetes mellitus and four patients had gestational diabetes. All diabetic patients in the study and control groups were treated by insulin during pregnancy.

Antepartum haemorrhage occurred in thirteen cases during pregnancy, nine of them had placenta

previa with recurrent episodes of bleeding during the third trimester, and four cases had abruptio of the placenta. In the control group two patients had antepartum haemorrhage due to placenta previa.

Anaemia was diagnosed in sixteen cases of the study group (8 in the control) during the index pregnancy. Eight of the sixteen cases suffered from sickle-cell disease with history of recurrent haemolytic crisis during pregnancy, the other patients had iron deficiency anaemia.

Fourteen cases in the study group had heart or lung disease compared to one in the control group.

Three cases were suffering from kidney disease or chronic urinary tract infection during the index pregnancy compared to one in the control group.

There are two general patterns of growth retardation symmetrical (normally proportioned, but small), and asymmetrical (where the head is disproportionately large compared to the trunk). The two groups overlap sometimes, and the asymmetrical growth can become symmetrical if nutritional deprivation continues for long period.

The symmetrical growth retardation is usually associated with intrinsic fetal factors, such as chromosomal defects, early-onset growth failure, poor subsequent growth and poor neurological development^{8,9}.

The asymmetrical growth retardation is usually associated with complications of later onset, particularly in pre-eclampsia.

Other complications such as diabetes mellitus, antepartum haemorrhage, anaemia, heart or lung disease and renal disease may be responsible for IUGR.

The effects of maternal age and parity have been studied in various aspects in man. Karn¹⁰ and Jayant¹¹ showed that birth weight increases with parity and age.

The maternal age in the study and control groups was classified into six age categories with an interval of five years (<20, 20–<25, 25–<30, 30–<35, 35–<40, <40).

Table 3 shows that the younger mothers (<20 years) give birth to lighter babies, compared to control group 45% and 22.5% respectively.

Table 4 shows an increase in the number of cases of IUGR in the primigravida compared to the multigravida. There were forty six cases observed to have infants with low birth weight, all of them with parity more than five. In cross-sectional studies an increase in mean birth weight is seen with increasing birth order. The biggest increase is from the first to the second-born child¹².

Table 5 shows in 55 cases (12 in the control group) the mother's height was less than 150 cms (27.5% and 6% respectively). In 95 cases (68 in the control group) the height was 150 <160cm (47.5% and 34% respectively) and in 45 cases (110 in the control group) the height was 160 <170cm (27.5% and 55% respectively).

Table 6 shows that 75 cases (15 in the control group) had weight gain <5kg (37.5% and 7.5% respectively). Ninety five cases (39 in the control group) had weight gain during pregnancy 5 <7.5kg (47.5% and 17.5% respectively) 25 cases (38 in the control group) had weight gain 7.5 <10 kg (12.5% and 19% respectively).

Several factors are known to be associated with reduction in the rate of fetal growth, they can be classified into two groups: variables with an incidence which is relatively stable across different populations and those factors which are clearly more prevalent in populations of developing societies.

TABLE 3
Maternal Age and IUGR

	Cases		Controls	
	No.	%	No.	%
< 20 Years	90	45	45	22.5
20 <25	39	19.5	75	37.5
25 <30	15	7.5	46	23.0
30 <35	20	10.0	20	10.0
35 <40	28	14.0	10	05.0
< 40	8	04.0	4	02.0
Total	200	100	200	100

TABLE 4
Parity and IUGR

	Cases		Controls	
	No.	%	No.	%
Para 1	84	42	32	16
Para 2	35	17.5	62	31
Para 3	18	9.0	55	27.5
Para 4	17	8.5	28	14
Para 5 and above	46	23	23	11.5
Total	200	100	200	100

TABLE 5
Height of Mothers Among Cases and Controls

	Cases		Controls	
	No.	%	No.	%
< 150 cm	50	27.5	12	6
150 < 160 cm	95	47.5	68	34
160 < 170 cm	45	22.5	110	55
> 170 cm	5	2.5	10	5
Total	200	100	200	100

TABLE 6
Weight Gain During Index Pregnancy Among Cases & Controls

	Cases		Controls	
	No.	%	No.	%
< 5 kg	75	37.5	15	7.5
5 < 7.5 kg	95	47.5	35	17.5
7.5 < 10 kg	25	12.5	38	19
10 kg	5	2.5	112	56
Total	200	100	200	100

The first group is associated with genetic influence, twin gestations, uterine and placental anomalies and major congenital malformations. These non-nutritional factors can account for about 50% of the variance in birth weight in developed countries¹³ and developing countries¹⁴.

In the second group, the variables which are associated with the level of socio-economic develop-

ment include pre-conceptional maternal nutritional status (as measured by height and pre-pregnancy weight), weight gain during gestation. Pre-eclampsia is associated with low socio-economic status and thus more prevalent in developing societies¹⁵. The second group of factors are influenced by environmental conditions, and they are responsible for increasing the incidence of IUGR. When these factors are not present or when their prevalence is reduced, as in developed societies, the non-environmental, biomedically related factors listed in the first group will play greater role in the causation of IUGR.

Tables 7 and 8 show that the majority of cases of intrauterine growth retardation in Bahrain are among the low socio-economic class and the illiterate.

TABLE 7
Social Class

	Cases		Controls	
	No.	%	No.	%
High	20	10	62	31
Middle	61	30.5	102	51
Low	119	59.5	36	28
Total	200	100	200	100

TABLE 8
Educational Level

	Cases		Controls	
	No.	%	No.	%
Illiterate	125	65.5	29	14.5
Intermediate	65	32.5	80	40.0
Secondary & Above	10	5	91	45.5
Total	200	100	200	100

The socio-economic class of a woman in Bahrain is based upon the occupation and the income of her husband. There are three classes: high which includes professionals and highly educated people; middle which includes the middle rank civil servants, teachers, accountants and clerks, low which includes labourers and illiterate people.

Smoking increases the incidence of IUGR although well recognised, has not been studied because it is not a widespread habit among women in Bahrain.

CONCLUSION

The results of this study suggest a direct correlation between intrauterine growth retardation and poor past obstetric history, complications during pregnancy, maternal height, low weight gain and low socio-economic status.

The factors affecting birth weight in Bahrian are the same as in other countries.

RECOMMENDATIONS

Improvement in the pregnancy outcome in Bahrain will probably follow raising the standard of health service, better nutrition, education, particularly among those in the lower social classes and the unsupported. It should be emphasised that efforts have been made in both areas of prevention as well as early diagnosis and detection of IUGR.

Preventive methods include, education of the pregnant women through television and radio programmes. At the antenatal clinics by booklets, videos and directly by midwives, health visitors and doctors.

The diet of the pregnant woman should be nutritious, providing the necessary vitamins and calorie requirement.

The role of the pre-conception clinic is very important in prevention of IUGR by treating medical problems of hypertension, diabetes, renal diseases and providing a medical advice for those with poor past obstetric history.

For early diagnosis and detection of cases of IUGR, stress should be made upon early booking clinic to confirm the period of gestation.

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