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Research Article

RISK FACTORS, MATERNAL AND PERINATAL OUTCOME OF FETAL MACROSOMIA

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ABSTRACT

Objective: Macrosomia is characterized by a birth weight exceeding 4000 g, regardless of gestational age, or >90th percentile for gestational age. This condition is linked to significant risks of maternal and neonatal morbidity and mortality. Globally, the prevalence of infants weighing ≥4000 g is estimated to be 9%. Various risk factors contribute to the development of fetal macrosomia, including a high pre-pregnancy body mass index (BMI), excessive weight gain during the antenatal period, high parity, male gender of the fetus, prolonged pregnancy, and maternal diabetes mellitus.

Methods: A retrospective cross-sectional study was undertaken in the Department of Obstetrics and Gynecology at GIMSR Teaching Hospital, over a 5-year period from May 2018 to May 2023. The study encompassed all singleton pregnancies with a birth weight equal to or exceeding 4000 g, irrespective of the delivery method. Maternal and neonatal records for the study population were systematically collected, and data were documented.

Results: Throughout the study duration, there were 167 cases where the birth weight equalled or exceeded 4,000 g. Most common maternal complication was prolonged labor and postpartum hemorrhage. Shoulder dystocia was seen in 2.9% of all deliveries and 10.8% of all vaginal deliveries. Most common neonatal complication was hypoglycemia.

Conclusion: The prevalence of macrosomia in our study was 3.86%. Main risk factors identified in our study were male gender, pre pregnancy BMI >25, previous macrosomic births and excessive weight gain during pregnancy.

Keywords: Macrosomia, Postpartum hemorrhage, Shoulder dystocia.

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INTRODUCTION

Macrosomia is defined by the American College of Obstetricians and Gynecologists as birth-weight over 4000 g irrespective of gestational age or >90th percentile for gestational age [1]. It is associated with considerable risk of maternal and neonatal morbidity and mortality. Worldwide, the prevalence of infants ≥4000 g is estimated to be 9% [2]. Many risk factors have been identified in the etiology of fetal macrosomia such as high pre pregnancy body mass index (BMI), excessive weight gain during antenatal period, high parity, male gender of fetus, prolonged pregnancy, and maternal diabetes mellitus [3-5]. Maternal risks of fetal macrosomia include arrested labor, cesarean deliveries, instrumental deliveries, genital tract lacerations, uterine rupture and postpartum hemorrhage [6,7]. Complications to the infant include birth asphyxia, birth injury such as brachial plexus injury and clavicular fracture due to difficult delivery and shoulder dystocia, meconium aspiration syndrome, neonatal hypoglycemia, and polycythemia [8,9]. These infants are also at higher risk of obesity and insulin resistance in adulthood [10].

METHODS

This was a retrospective cross-sectional study conducted in the Department of Obstetrics and Gynecology, GIMSR teaching hospital, over a period of 5 years from May 2018 to May 2023. Approval from Institutional Ethics Committee was taken before commencing the study. All singleton pregnancies with birth weight 4000 g or greater irrespective of the route of delivery were included in the study. Maternal and neonatal records of the study population were collected and data recorded.

The aim of the present study is to estimate the prevalence of fetal macrosomia, identify the risk factors and to study the maternal and perinatal outcome.

The following data were collected and analyzed.

1. Maternal characteristics such as age, parity, previous history of baby with macrosomia, pre pregnancy BMI, weight gain during pregnancy, presence of comorbidities such as diabetes mellitus and pre-eclampsia.
2. Obstetrical outcome variables such as gestational age at the time of delivery, duration of labor, mode of delivery, indication for cesarean section, shoulder dystocia and maternal complications such as postpartum hemorrhage and genital tract lacerations.
3. Neonatal outcome variables such as weight of the baby, sex of the baby, birth asphyxia, birth trauma, hypoglycemia and perinatal death.

Statistical analysis

Data were entered into MS-Excel and analyzed using SPSS Version 25. Qualitative variables were represented with frequency and percentage. Quantitative variables were represented with mean with SD.

RESULTS

During the study period, there were a total of 4329 deliveries, of which 167 had birth weight equal to or >4000 g. The prevalence of macrosomia in the present study was 3.86%. Birth weights varied between 4 kgs and 4.79 kgs (mean birth weight 4.2±0.72). 149 babies had birth weight 4 to <4.5 kgs, 18 babies had birth weight more than 4.5 kgs. Male babies were predominant accounting for 110 cases (66%) and female babies accounted for 57 cases (34%).

Most of the cases of macrosomic births were in the age group of 20–25 years (53.9%), para 1 (58%), had a history of previous macrosomic birth (56%), prepregnancy BMI>25 kg/m^2 (57.5%), and maternal weight gain >16 kgs (51.5%). Diabetes was seen in 18% of the study population. Prolonged pregnancy was seen in 10% (Table 1).

The predominant mode of delivery in the cases was cesarean section, accounting for 72.4%, with elective cesareans constituting 40.5%, and emergency cesareans making up the remaining 59.5% (Table 2).

Among the indications for cesarean section, the leading reasons included a previous cesarean scar (29.8%) and fetal distress (26.4%), followed by second-stage arrest (11.6%), protracted dilatation and descent (10.7%), cephalopelvic disproportion (8.26%), failed induction (5.8%), malpresentation (4.13%), antepartum hemorrhage (2.48%), and pre-eclampsia (0.83%) (Table 3).

In terms of maternal complications, prolonged labor accounted for 16.1%, atonic postpartum hemorrhage for 9.6%, traumatic postpartum hemorrhage for 3.6%, and third-degree perineal tear for 1.2% (Table 4).

Among the perinatal complications, the leading reasons included neonatal hypoglycemia (21%), birth asphyxia (16%), shoulder dystocia (2.9%), brachial plexus injury (1.2%), clavicular fracture (1.2%), and perinatal death (0.6%) (Table 5).

DISCUSSION

The prevalence of fetal macrosomia in our study was 3.86%. Male sex, age above 30 years, higher parity, prepregnancy BMI ≥25, previous macrosomic births, maternal weight gain above 16 kgs during pregnancy, and post-term pregnancy were all significant risk factors associated with macrosomia in the various studies [11-14]. In our study we found a higher number of macrosomia cases with male sex, prepregnancy BMI ≥25, previous macrosomic births and maternal weight gain more than 16 kgs (Table 1). But in contrast, this study did not observe higher number of macrosomia with maternal age above 30 years and higher parity, as majority of the macrosomic babies were born to maternal age group between 20 and 30 years and to para 1 (Table 1). This could be due to the small size of study population and influence of racial, ethnic and genetic factors [15]. It has been reported that 38–40% of macrosomic babies are born to mothers with at least one identifiable risk factor [16].

In our study, 18% of the women had diabetes mellitus (Table 1), which was higher than the study done by Said and Manji [17]. The reported rate of maternal complications of macrosomia range from 3.1% to 7.3% [18]. Main maternal complications in our study were prolonged labor in 27 cases (16.1%) and postpartum hemorrhage in 22 cases (13.1%). (Table 4). Two cases had third degree perineal tear both of which were delivered by outlet forceps. Most of the cases of postpartum hemorrhage in our study may be due to prolonged labor resulting in uterine atony. However, there were no maternal deaths in our study.

About 72.4% of the macrosomic babies were delivered by cesarean section in our study (Table 2), which was higher compared to other studies [19]. Emergency cesarean section was done in 72 cases (59.5%), most common indication being fetal distress followed by second stage arrest and delayed progression of labor (Table 3). Higher number of cesarean sections in our study may be due to more number of cases with the previous cesarean scar and increased use of cardiotocography identifying more number of cases of fetal distress. Forceps delivery was done in 11 cases (6.6%), out of which 2 had third degree perineal tears. Fetal macrosomia and forceps delivery were found to be risk factors for obstetric anal sphincter injury in some studies [20].

Birth asphyxia was seen in 16% of the cases (Table 5), the most common cause being arrest of labor and fetal distress. Birth trauma due to shoulder dystocia was noted in 4 cases (2.4%), out of which two were clavicular fractures and two were brachial plexus injuries. Shoulder dystocia was seen in 5 cases (2.9%), four of which were delivered by normal vaginal delivery and one by forceps delivery. The incidence of shoulder dystocia in our study was 10.8% of all the vaginal deliveries.

Table 1: Distribution of maternal risk factors

Parameters	No of cases	Percentage
Maternal age		
<20 years	7	4.2
20–25 years	90	53.9
26–30 years	49	29.3
31–35 years	16	9.6
>35 years	5	3
Parity		
Para 0	60	36
Para 1	97	58
Para 2	10	6
Diabetes		
Present	30	18
Absent	137	82
Previous macrosomia		
Yes	60	56
No	47	44
Prepregnancy BMI		
<25 kg/m^2	71	42.5
>25 kg/m^2	96	57.5
Maternal weight gain		
>16 kgs	86	51.5
<16 kgs	81	48.5
Gestational age at delivery		
37–40 weeks	150	90
>40 weeks	17	10

Table 2: Mode of delivery

Mode of delivery	Number of cases	Percentage
Normal vaginal delivery	35	21
Instrumental vaginal delivery	11	6.6
Cesarean section	121	72.4
Elective	49	40.5
Emergency	72	59.5

Table 3: Indications for cesarean section

Indication	No. of cases (*n*=121)	Percentage
Previous cesarean scar	36	29.8
Fetal distress	32	26.4
Second stage arrest	14	11.6
Protracted dilatation and descent	13	10.7
Cephalo pelvic disproportion	10	8.26
Failed Induction	7	5.8
Mal presentation	5	4.13
Antepartum hemorrhage	3	2.48
Pre-eclampsia	1	0.83

Table 4: Distribution of maternal complications

Maternal complication	No. of cases	Percentage
Prolonged labor	27	16.1
Atonic postpartum hemorrhage	16	9.6
Traumatic postpartum hemorrhage	6	3.6
Third degree perineal tear	2	1.2

Table 5: Distribution of perinatal complications

Perinatal complication	No. of cases	Percentage
Shoulder dystocia	5	2.9
Birth asphyxia	27	16
Brachial plexus injury	2	1.2
Clavicular fracture	2	1.2
Neonatal hypoglycemia	35	21
Perinatal death	1	0.6

Shoulder dystocia is the most difficult and infrequent perinatal complication which is seen with an incidence ranging from 0.2 to 9.5% of all the vaginal deliveries for macrosomic babies [21].

Neonatal hypoglycemia was seen in 35 babies (21%) (Table 5), out of which 18 babies were born to diabetic mothers. Macrosomic infants require close monitoring for hypoglycemia regardless of maternal diabetic status. Perinatal death was seen in one baby (0.6%) due to birth asphyxia, which was delivered vaginally. The perinatal death rate was lower when compared to other studies 6–12% [22], which was due to timely anticipation of complications and timely intervention.

CONCLUSION

The prevalence of macrosomia in our study was 3.86%. In this study, we aimed to analyze the risk factors, maternal, and perinatal outcome of fetal macrosomia. Main risk factors in our study were male gender, prepregnancy BMI >25, previous macrosomic births and excessive weight gain during pregnancy. Major maternal complications included prolonged labor and postpartum hemorrhage. Major perinatal complications included birth asphyxia and neonatal hypoglycemia. It is important to identify the risk factors for fetal macrosomia to effectively prevent maternal and perinatal complications.

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