

Profile of Macrosomic Babies at a Tertiary Level Hospital

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Abstract

Introduction: Macrosomia is known to be associated with adverse neonatal outcomes. The aim of this study was to estimate the incidence of macrosomia in a tertiary teaching hospital of Nepal based on local intrauterine foetal growth percentile curve according to gestational age, risk factors for morbidity and mortality and neonatal outcome of macrosomia.

Materials and Methods: This was a descriptive observational study done on live term macrosomic babies delivered during the study period at KIST Medical College Teaching Hospital, Lalitpur Nepal. The maternal and neonatal records of macrosomic babies were reviewed. All the macrosomic babies were followed up till discharge. Macrosomic babies needing admission into the neonatal care unit were considered as ones with complication. Maternal and neonatal risk factors associated with neonatal complications were analysed. **Results:** Among total of 2922 live singleton deliveries, 342 (11.7%) babies were macrosomic. The neonatal complications associated with macrosomia were seen in 19.6%. The risk factors significantly associated with neonatal complications were mode of delivery via caesarean section, instrumental delivery and 1 min low Apgar score. Maternal diabetes leading to macrosomia however was seen in only one case. The most common neonatal complications were neonatal sepsis (11.4%), significant hyperbilirubinaemia (2%) and transient tachypnoea of newborn (1.6%). **Conclusions:** Neonatal sepsis was the major cause of morbidity even in the macrosomic babies. Importance of early interventions for prevention and management of macrosomic babies with neonatal sepsis needs to be emphasized.

Key words: Macrosomia, Neonatal complication, Neonatal sepsis, Tertiary hospital.

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Introduction

Low birth weight babies have attracted much more attention to medical practitioners, and a lot of resources and researches have been directed toward improving their morbidity and mortality. However in developing countries, the increase in frequencies of obesity and diabetes in pregnant women has led to the trend of a consistent increase in the mean birth weight and in the proportion

of macrosomia¹. Macrosomia in developing countries has been recognized as a public problem as it could increase in future¹. In addition, the deliveries of macrosomic babies are associated with increased perinatal morbidity and mortality secondary to perinatal asphyxia, hypoglycaemia, hyperbilirubinaemia, sepsis and trauma².

Different geographic populations have different prevalences of macrosomia as documented by various previous studies^{1,3}. However, there is scarcity of published studies in Nepal that use local intrauterine foetal growth curve⁴ to determine the prevalence and adverse neonatal outcomes associated with macrosomia. The objective of this study was to estimate the incidence of macrosomia in a tertiary care level teaching hospital of Nepal based on local intrauterine foetal growth percentile according to gestational age specific to local curves, risk factors for neonatal morbidity and mortality of macrosomia and outcome of macrosomia.

Material and Methods

This was a descriptive observational study done on live macrosomic babies delivered at 37 to 42 completed weeks of gestation at KIST Medical College Teaching Hospital (KISTMCTH), a 700 bedded tertiary level care hospital located at Lalitpur district of Nepal. The study period was four years from 17th July, 2010 to 16th July, 2014. Macrosomia was defined as birth weight of 4000 grams or greater than 90th percentile according to gestational age specific local curves⁵. Multiple birth and stillbirths were excluded.

The hospital records of macrosomic babies were reviewed for maternal demographic profile, medical condition of the mother and mode of delivery. Maternal demographic characteristics were age, gravida, period of gestation, and associated co morbidity conditions. Details of the macrosomic babies evaluated were gestational age at delivery, birth weight, gender and Apgar score. All the macrosomic babies were followed up till the time of discharge from the hospital. The macrosomic babies, needing admission into the neonatal care unit due to one or more morbidities, were considered as complicated ones. Risk factors associated with complications and final outcomes of these babies were analyzed.

Data were entered and analyzed using the Statistical Package for Social Science (SPSS) 17.0 version (Chicago IL, USA), chi-square and Fisher's Exact test was used to determine the significance of maternal and neonatal risk factors associated with neonatal complication.

Approval to conduct the study was taken from the institutional review committee (IRC) of KIST Medical College.

Results

During the study period, a total of 2922 live term singleton deliveries occurred. Among them, 342 (11.7%) babies were found to be macrosomic.

The maternal age of the majority of macrosomic babies was between 20 to 34 years (86.5%) (Table 1). The average period of gestation at delivery was 38.87±1.26 weeks. More than 60% of the mothers were multiparous and 7% of macrosomic mothers had associated co-morbidities. The common co-morbidities associated in the mothers with macrosomic babies were pregnancy induced hypertension (5%) followed by intrahepatic cholestasis of pregnancy (0.6%) and eclampsia (0.6%). Maternal diabetes mellitus however was seen in only one case. The percentage of babies delivered by caesarean section was higher than normal vaginal delivery (50.6% versus 48.0%).

About two third of macrosomic babies were male (Table 2). The mean birth weight was 3650 grams and 12.3% weighed 4000 grams or more. The 1 minute Apgar score was less than 7 in 3.8% of babies and more than 99% of babies had 5 minute Apgar score of greater than 6.

The neonatal complications associated with macrosomia were seen in 19.6% of babies warranting admission into the neonatal care unit. The maximum neonatal complications were seen in babies of multigravida, medical complications, age <20 years and ≥35 years, caesarean section or instrumental delivery (Table 2). Similarly, male gender, birth weight ≥ 4000 grams, < 7 Apgar score at 1 minute and 5 minute were associated with greater neonatal complications (Table 2). The statistical analysis using chi-square and Fisher's Exact test showed that the risk factors significantly associated with neonatal complication were caesarean section or instrumental delivery compared to vaginal delivery (*p* value 0.002) and Apgar score less than 7 compared to Apgar score greater than ≥7 at 1 minute (*p* value 0.005).

The most common neonatal complication was neonatal sepsis (11.4%) followed by significant hyperbilirubinaemia (2%) and transient tachypnoea of newborn (1.6%) (Table 3). However, almost all cases were discharged without any sequel except for one with overwhelming sepsis who was referred to other centre on parents' request and could not be followed up hence the outcome was unknown. In this study, there was no neonatal mortality.

Table 1: Comparison of maternal risk factors among uncomplicated and complicated macrosomic babies

Risk factor	Macrosomic babies (n=342)	Uncomplicated macrosomic babies (%) n=275	Complicated macrosomic babies (%) n=67	p-value
Age of mother (years)				
<20	23	18(78.3)	5 (21.7)	0.74
20-34	296	240(81.1)	56 (18.9)	
≥35	23	17(73.9)	6 (26.1)	0.40
Period of Gestation at delivery (in completed weeks)				0.43
37	60	50(83.3)	10 (16.7)	
38	76	60(78.9)	16 (21.1)	
39	93	78(83.9)	15 (16.1)	
40	79	64(81.0)	15 (18.1)	
41	30	20(66.7)	10 (33.3)	
42	4	3(75.0)	1 (25.0)	
Gravidity of mother				0.27
Primi	133	103(77.4)	30(22.6)	
Multi	209	172(82.3)	37(17.7)	
Co morbidity in mother				0.87
None	318	256(80.5)	62(19.5)	
Present	24	19(79.2)	5(20.8)	
Mode of delivery				0.002
Normal delivery	164	145(88.4)	19(11.6)	
Caesarean section	173	126(72.8)	47(27.2)	
Instrumental delivery	5	4(80.0)	1(20.0)	

Table 2: Comparison of neonatal risk factors among uncomplicated and complicated macrosomic babies

Risk factor	Macrosomic babies n=342	Uncomplicated macrosomic babies (%) n=275	Complicated macrosomic babies (%) n=67	p-value
Gender of newborn				0.30
Male	227	179(78.9)	48(21.1)	
Female	115	96(83.5)	19(16.5)	
Birth weight (in grams)				0.17
Less than 4000	300	247(82.3)	53(17.7)	
4000 and more	42	28(66.7)	14(33.3)	
Apgar score at 1minute				0.005
≤6	13	6(46.2)	7(53.8)	
>6	329	269(81.8)	60(18.2)	
Apgar score at 5 minute				0.09
≤6	3	1(33.3)	2(66.7)	
> 6	339	274(81.3)	65(19.2)	

Table 3: Neonatal complications among macrosomic babies

Neonatal complications	Frequency	Percent (out of total 342 macrosomic babies)
Neonatal Sepsis	39	11.4
Neonatal Sepsis with significant Hyperbilirubinaemia	6	1.7
Neonatal Sepsis with Meconium aspiration syndrome	2	0.6
Significant Hyperbilirubinaemia	7	2.0
Transient Tachypnoea of Newborn	6	1.7
Transient Tachypnoea of Newborn with significant Hyperbilirubinaemia	2	0.6
Hypoglycemia	1	0.3
Perinatal Asphyxia	1	0.3
Perinatal Asphyxia with Hypoxic ischaemic encephalopathy	1	0.3
Congenital Heart Disease	1	0.3
Congenital Syphilis	1	0.3

Discussions

The incidence of macrosomia in our study was 11.7 %. This is higher than a recent study done in developing countries of Asia including Nepal (9%) where identification of macrosomia was done on the basis of mean birth weight cut-off irrespective of gestational age¹. This study included the babies with birth weight either greater than 4000 grams irrespective of gestational age or birth weight greater than the 90th percentile for gestational age population specific.

In the context of this study, the incidence of neonatal complications was seen in 67 macrosomic babies (19.6%) necessitating admission into the neonatal care unit. The incidence of complicated macrosomia varies greatly in previous studies. According to Onalo et al, 39.5% of macrosomic babies had neonatal complications². In another study the neonatal complications were seen in only 3.9% macrosomic babies⁶. However, it has been reported that the neonatal complication in macrosomic babies is higher compared to normosomic babies in study done by Linder et al⁷.

Various maternal as well as neonatal factors were evaluated for the associated neonatal complications. Regarding maternal factors, it was seen that babies born via caesarean section or instrumental delivery had statistically significant neonatal complications, which could be due to the fact that indications for these deliveries could be due to pre existing fetal compromise like foetal distress, pre-labor rupture of

membrane, antepartum haemorrhage, prolonged labor etc. leading to poor outcome. In fact, most of the babies with neonatal complications were delivered via caesarean section rather than vaginal delivery (27.2% versus 11.6%) with low Apgar score at 1 and 5 minute. Similar results in babies born via caesarean section were found in previous studies^{2,8}. Similarly regarding neonatal characteristics, the macrosomic babies with Apgar score of ≤ 6 at 1 had statistically significant neonatal complications. However it has been reported in previous study that the incidence of neonatal morbidity in babies with birth weight ≥ 3500 grams was significantly increased with low Apgar at 5 minute⁹.

This study showed that macrosomic babies had higher rates of neonatal sepsis, hyperbilirubinaemia and transient tachypnoea of the newborn. Neonatal sepsis is the leading cause of morbidity in Nepal¹⁰. The prevalence of neonatal sepsis has been reported up to 52% in Nepal¹¹. This study showed that even in macrosomia the major cause of neonatal morbidity is sepsis (11.4%). In another study done in developing country, almost similar incidence of sepsis in macrosomia was reported (8.9%)². There is also evidence from previous study done in Nepal that delivery via caesarean section and low Apgar score at 1 and 5 minute were predictors of neonatal sepsis¹⁰.

Significant hyperbilirubinaemia requiring phototherapy was one of the common neonatal complications seen in this study. But it was seen in only 2% of macrosomic babies which was lower than the incidence reported by Onalo et al (4.5%)² and Linder et al (5.4%)⁷.

Macrosomia in this study was associated with increased risk of transient tachypnoea of newborn (1.7%). Similar result was reported by Linder et al (1.5%)⁷. Moreover a significantly higher incidence of neonatal complications was seen in male babies in this study. Medical literature also reported that male babies delivered via caesarean section have increased risk of developing transient tachypnoea of new born¹².

In this study the incidence of perinatal asphyxia including hypoxic ischaemic encephalopathy was 0.6%. The lower and higher incidence rate of perinatal asphyxia 0 % and 13.6% respectively were reported by Lipscomb et al and Navti et al^{6,13}. In contrast to our study, only 22% of macrosomic babies were delivered via caesarean section in study by Navti et al⁶.

The incidence of neonatal hypoglycaemia was low (0.3%) in this study. Unlike several studies where maternal diabetes was the major risk factor associated with macrosomia^{1,3}, we found only one case of maternal diabetes associated with macrosomia. The low incidence of neonatal hypoglycaemia compared to previous studies could be explained by low incidence of maternal diabetes in our study. It has been reported that symmetric macrosomic newborns of non-diabetic mothers had a similar hypoglycaemic rate compared to normosomic infants (0.3%)⁷. Again, according to Linder et al, the incidence of hypoglycaemia varies with birth weight, ranging from 0.8% in infants with a birth weight of 4000–4499 g to 25% in infants with a birth weight of ≥ 5000 g⁷. There were only 12.3% macrosomic babies weighing 4000 grams and more in this study.

There were no cases of birth injuries in the neonates. Similar result was reported by Ezegwuiv et al¹⁴. Birth injuries are positively associated with increase in birth weight. The newborns with birth weight 4500 g or heavier carried six times higher risk of birth trauma¹⁵. The absence of birth injuries compared to other studies^{2,13} could also be due to the high rate of caesarean deliveries in this study.

This study has some limitations. First, maternal body mass index (BMI) is known to be associated with macrosomia and neonatal morbidity and mortality¹⁶. Maternal BMI could not be calculated in this study because only maternal weight was mentioned in the case sheets and not height. Secondly we were unable to classify the macrosomic babies into symmetrical and non-symmetrical subgroups based on weight length ratio due to unavailability of length of babies. It has been reported that neonatal complications like polycythaemia, hypocalcaemia is rare in symmetrical macrosomic babies⁷.

Conclusion

The prevalence of macrosomia was comparable as that of other developing countries. Macrosomic babies born via caesarean section or instrumental delivery or with low initial Apgar had higher incidence of complications. Therefore, in developing countries like Nepal, neonatal sepsis is the major cause of morbidity even in macrosomic babies. Importance of early interventions for prevention and management of macrosomic babies with neonatal sepsis needs to be emphasized.

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