

## A one-year review of macrosomic births at the Cantonal Hospital Zenica, Bosnia and Herzegovina

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### ABSTRACT

**Aim** To identify a rate of macrosomic births in a one-year review, associated maternal characteristics and pregnancy outcome.

**Methods** This one-year retrospective review included all macrosomic deliveries at the Department of Obstetrics and Gynaecology at the Cantonal Hospital Zenica between 1 January 2018 and 31 December 2018. The data were collected from maternal and newborn medical records. A total of 361 singleton normal birth weight term newborns (birth weight < 4000 g, but not small for gestational age) who were delivered in the same period, represented the control group.

**Results** Among the total of 2758 women who gave birth, 360 (13.05%) macrosomic infants (birth weight more than 4000 g) were delivered. Mean birth weight was 4258.90 g (maximum 5460g); nine (0.33%) were >5000g. Male macrosomic infants were more frequently represented, 245 (68,1%) comparing to the control group ( $p<0.01$ ); in the control group female infants were more frequently represented ( $p<0.01$ ). The overall Cesarean section rate, including elective Cesarean delivery was 23.2%, and 76.1% underwent an attempt of labour delivered vaginally.

**Conclusion** Macrosomia represents a risk for adverse outcome for the mother and neonate, with a higher risk for the operative mode of delivery.

**Key words:** birth weight, delivery, fetal macrosomia, fetal outcome, pregnancy

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## INTRODUCTION

The term macrosomia is used to describe a newborn with an excessive birth weight. A diagnosis of fetal macrosomia can be made only by measuring birth weight after delivery; therefore, the condition is confirmed only retrospectively, after the delivery of the neonate. Fetal macrosomia has been defined in several different ways, including birth weight greater than 4000-4500 g or greater than 90% for gestational age (1).

Although its occurrence differs among races and ethnic groups, it affects approximately 6-10% of all newborns (2). Factors associated with fetal macrosomia include maternal diabetes, multiparity, previous history of macrosomic deliveries, increased body mass index or obesity, excessive weight gain in pregnancy and parental height (3). Maternal problems include high frequency of Cesarean sections, perineum lacerations, postpartum haemorrhage, prolonged hospitalization, and puerperal infections. The newborns are at risk of shoulder dystocia, fracture, intrauterine hypoxemia, intensive care unit admission and death (4).

These complications have been studied mainly by comparing delivering macrosomic newborns to women delivering non-macrosomic newborns, thereby using fetal birth weight as a primary risk factor. Little attention has been paid to parameters other than fetal weight that may specifically occur in women delivering macrosomic infants (5).

The intrapartum management of macrosomic fetuses represents a challenge for the obstetrician owing to potential maternal and neonatal complications. Maternal morbidity includes increased rates of Cesarean section, uterine atony and extensive perineal lacerations that may cause severe haemorrhage. Neonatal complications consist of birth trauma associated with shoulder dystocia, brachial plexus injury, clavicular fracture, hypoxic-ischemic encephalopathy, hypoglycemia, respiratory distress and death (6,7). These adverse outcomes were reported in diabetic as well as non-diabetic pregnancies (8,9).

In Bosnia and Herzegovina (B&H) there is a similar research (2007) conducted in the Clinical Hospital Mostar with incidence of macrosomic births of 13.1% in a 2-year review (10).

The aim of this study is to determine the incidence of macrosomic births and the associated

maternal characteristics and to ascertain the fetal outcome.

## PATIENTS AND METHODS

### Patients and study design

The study was conducted at the Department of Obstetrics and Gynaecology of the Cantonal Hospital Zenica, B&H. It was a one-year retrospective review of macrosomic deliveries, between 1 January 2018 and 31 December 2018, analysing associated maternal characteristics and pregnancy outcome and comparing these to selected normal birth weight deliveries.

The data were collected from the maternal and newborn medical records at the Cantonal Hospital Zenica including maternal age, gestational age at delivery, and parity. Gestational age at delivery was recorded as determined by last menstrual period or ultrasound scan done not later than the 20<sup>th</sup> week of pregnancy.

### Methods

Data on the mode of delivery, outcome of the delivery (e.g. weight and gender of the newborn) APGAR score in the first and fifth minute and any events of perineal trauma were also collected.

A total number of 360 women gave birth to macrosomic newborn. The birth weight  $\geq 4000$  g) was considered as macrosomia and they were selected as the observed group. All of them were term births ( $\geq 37$  weeks estimated gestational age). Preterm deliveries, cases of intrauterine fetal death and multiple pregnancies were excluded from the study.

The control group considered an equal number of births with a newborn weight under 4000 g.

Maternal age, gestational age, the incidence of operative deliveries and perineal trauma between macrosomic and normal weight groups were compared. The groups were compared with respect to the neonatal outcome: newborn gender (male and female) and 1<sup>st</sup> and 5<sup>th</sup>-min Apgar score.

### Statistical analysis

Comparative analysis was done between the two groups. Continuous variables were presented as mean (SD) and tested by the independent samples Student's T-test, while categorical data were

expressed as numbers and the test for association was done using the  $\chi^2$  test. The  $p < 0.05$  was considered as statistically significant.

## RESULTS

During the period between 1 January and 31 December 2018 there was a total of 2758 women who gave a birth at the Department of Obstetrics and Gynaecology. The total number of macrosomic infants was 360 (13.05%); only nine (0.33%) were  $>5000$ g. The mean maternal age was 28.44 years and it was not significantly higher than the control group ( $p=0.416$ ). Mean parity was not significantly higher in the study group compared to the controls, 1.79 and 1.67, respectively ( $p=0.101$ ). Mean birth weight in the study group was 4258.90 g (maximum 5460 g). Macrosomic infants were more frequently male comparing to the control group ( $p < 0.01$ ) where female infants were more frequently represented ( $p < 0.01$ ).

Male macrosomic newborns were longer compared to control group ( $p < 0.01$ ) (Table 1). There was no statistically significant correlation between age and birth weight of infants in the study group ( $p < 0.223$ ).

Apgar score in the first and fifth minute was higher in controls compared to the study group ( $p < 0.012$  and  $p < 0.008$ , respectively). A correlation between advanced maternal age and parity was statistically significant ( $p < 0.01$ ) (Table 1).

Most of the deliveries in the study and control group occurred at a gestational age of 37–39 weeks. None of the mothers had a pregnancy that lasted longer than 42 weeks. Mean gestational age was significantly higher in the study group compared to the control group ( $p=0.01$ ).

The overall Cesarean section rate, including elective Cesarean delivery and failed attempt of labour in the study group was 23.2% (84 out of 361), and 76.1% (274 out of 361) of those undergoing an attempt of labour delivered vaginally (Table 1).

Cephalopelvic disproportion occurred in 70 (19.4%) deliveries in the study group, seven (1.9%) were prolonged deliveries and seven (1.4%) cases represented hypertension in pregnancy. Maternal complications with vaginal delivery of macrosomic infants resulted in 54 (15%) lacerations requiring repair (perineal injury) and

**Table 1. Characteristics of macrosomic infant deliveries**

Variables	Controls (n=360)	Macrosomia (n=360)	p
<b>Gender (No, %)</b>			
Males	169 (49.9)	245 (68.1)	0.01
Females	191 (50.1)	115 (31.9)	0.01
<b>Maternal age (years)</b>	28.13	28.44	0.416
<b>Parity mean</b>	1.67	1.79	0.101
<b>Parity (No, %)</b>			
1	165 (45.8)	191 (53.1)	
2	135 (37.5)	122 (33.9)	
3	43 (11.9)	34 (9.4)	
>4	6 (1.7)	13 (3.6)	
<b>Mean gestational age (weeks)</b>	39.3	40.3	
<b>Type of delivery (No, %)</b>			
Vaginal	298 (82.8)	274 (76.1)	
Cesarean section	61 (16.9)	84 (23.3)	
VE	1 (0.3)	2 (0.6)	
<b>Mean Apgar score</b>			
1 <sup>st</sup> minute	7.9	7.8	0.012
5 <sup>th</sup> minute	8.7	8.9	0.008
<b>Mean fetal weight (g)</b>	3366	4258.9	
<b>Mean fetal length (cm)</b>	49.2	51.7	
<b>Perineal injuries (No, %)</b>	45 (12.5)	54 (15)	0.233
<b>Correlation between age and birth weight - Negative</b>	-	360	0.223
<b>Correlation between advanced maternal age and parity - Positive</b>	-	360	<0.01

45 (12.5%) in controls ( $p=0.233$ ). There was no related perinatal or maternal mortality. The number of patients with perineal injuries was low in both study groups, and there was no statistically difference among them ( $p=0.233$ ).

## DISCUSSION

Our research results suggest that macrosomia was associated with increased risks of Cesarean section and a trauma of the birth canal and the fetus. Advanced maternal age and gestational age at birth emerged as predisposing factors for macrosomia. Fetal birth weight could be predictive for the mode of delivery.

According to other studies (1), the risk of morbidity for newborn and women increases drastically when the birth weight is more than 4500 g. Our findings are not similar to findings of those studies, which can be explained by a small sample size. In our study there were no cases of perinatal and maternal mortality. According to Boulet et al. (11) birth weight categories can determine predictive thresholds of adverse outcomes, e.g. a definition of macrosomia as  $>4000$  g may be useful for the identification of increased risks of labour and newborn complications,  $>4500$  g may be more predictive of neonatal morbidity, and

>5000 g may be a better indicator of infant mortality risk.

Analysing the impact of mode of delivery and the outcome of the birth, we observed that the rate of elective Cesarean section was higher in the study group. The Cesarean delivery was largely due to the cephalopelvic disproportion and our findings are consistent to those of Said et al. (12).

Fetal distress and/or the threat of asphyxia were higher in the study group in our study, as indicated by the lower Apgar score at 1<sup>st</sup> and 5<sup>th</sup> minute. According to King et al. (13) macrosomia is associated with a higher rate of injuries during labour. In our study the number of patients with perineal injuries was low in both study groups. According to Najafian et al. (2012) there was a positive association between cervical and/or vaginal lacerations and macrosomia (14); however, our results showed that the number of vaginal tears in the macrosomia group was less than those in control group. An explanation for this may be that macrosomic neonates are commonly delivered by Caesarean section; hence, normal vaginal and instrumental deliveries are more frequent in the control group.

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