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ASSESSMENT OF MATERNAL RISK FACTORS ASSOCIATED WITH MACROSOMIA AT A RURAL HEALTH TRAINING CENTER OF SOUTHERN RAJASTHAN

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ABSTRACT

Background: Fetal macrosomia is a common complication seen nowadays, which can cause complications to both mother and the child. Fetal macrosomia is also associated with a high risk of mortality and morbidity and data were reported from all over the globe. Fetal macrosomia is defined and characterized when birth weight is more than or equal to 4000 gms, or we can say that birth weight is more than the 90th percentile. **Material & Methods**: The present community-based retrospective and cross-sectional study was conducted at the rural health training center of the department of community medicine of our tertiary care hospital. Study duration was of two and half month. **Results:** Out of 24 mothers of age ≥ 40 years 10 (55%) had a macrosomic child showing a significant association. Out of 40 mothers of high socioeconomic status 6 (34%) had macrosomic child (p-value<0.05). In the present study, we found that there was the non-significant association between macrosomia and mother's height ≤145 cm, i.e. p-value > 0.05. Out of 46 mothers of high Parity ≥4, 6 (34%) had macrosomic child (p-value<0.05). Out of 348 mothers of anemia during pregnancy, 5 (27.7%) had macrosomic child (p-value<0.05). In the present study, we found a non-significant association between macrosomia and ≥three abortions and hypertension during pregnancy, i.e. p-value > 0.05. A highly significant association was found between diabetes during pregnancy and macrosomia, i.e. p-value <0.001. **Conclusion:** Macrosomia was significantly associated with maternal diabetes, both the gestational and previously existing. Macrosomia was also associated with mother's age more than 40 years and the parity level of more than 4 children.

Keywords: Macrosomia, Risk factors, Newborn.

INTRODUCTION

Fetal macrosomia is a common complication seen nowadays, which can cause complications to both mother and the child. Fetal macrosomiais also associated with a high risk of mortality and morbidity and data were reported from all over the globe(1).Fetal macrosomia is defined and characterized when birth weight is more than or equal to 4000 gms, or we can say that birth

weight is more than the 90th percentile(2). Some studies stated that fetal macrosomia is defined and characterized when birth weight is more than or equal to 4500 gms. Prevalence of fetal macrosomia reported in all previous studies from worldwide was in the range of 1.9 % to 14.6 %.Various risk factors have been reported for the fetal macrosomia(3). These include maternal obesity, gestational diabetes, excessive weight gain in antenatal period, high Body Mass Index (BMI), multiparity, post-term pregnancy, male sex, prolonged gestation and parental height(4).

Antenatal diagnosis of fetal macrosomia might help in combating morbidity and mortality, but it is sometimes missed clinically or even with ultrasonography. During labour, macrosomia may result in cephalo-pelvic disproportion, which can induce fetal distress among infants. Maternal complications due to macrosomia include dysfunctional uterine contractions, postpartum hemorrhage, increased Caesarian section, prolonged labor, uterine rupture, perineal lacerations, spontaneous symphysiotomy and obstetrical neuropathy(5). All these complications are in direct proportional to the increases in the birth weight of the infant. Fetal and neonatal complication of macrosomia includes birth trauma, shoulder dystocia, fracture of the clavicle or humerus, Erb's palsy,neonatal asphyxia, hypoglycemia, hypocalcemia, hypomagnesemia, Polycythemia, hyper-bilirubinemia, neonatal infection and perinatal death(6).

Only a few studies on fetal macrosomiahad focused on the risk factors and outcome, despite high morbidity and mortality rates(7). In our study area, there was decidedly fewer data available till date. Hence, the aim of the present study to assess risk factors for fetal macrosomiato prevent its complications and to manage it appropriately.

MATERIALS & METHODS

The present community-based retrospective and cross-sectional study was conducted at the rural health training center of the department of community medicine of our tertiary care hospital. Study duration was of two and half month, from July to September 2018.Considering the high-risk pregnancy prevalence approximately 14.6% (taken from previous studies) and we take allowable error margin of 20% at 90% power and 95% level of significance. We calculate the sample size by using the formula (n) = $4PQ/d^2$, where P= prevalence (proportion- 10%), Q= (1-P), d= relative allowable error (20%) and n= sample size. The calculated sample size for the present study after rounding off came out to be 600.Clearance from Institutional Ethics Committee was taken before the start of the study and written informed consent for the study purpose was obtained from all the enrolled participants. All the patients were subjected to a pretested proforma and socio-demographic data (by modified B.J. Prasad scale) were recorded along with detailed general physical and clinical examination. All the mothers who were delivered within last year, residents of our study area and had complete records of their ANC period and delivery were included in the present study. Mothers who not responding or not given consent had twin babies or in the cases of maternal mortality, were excluded from the present study. Our study area consists of 6 sub-centers, these six centers acted as clusters for the present study. Since study sample size was 600, we enrolled 100 mothers from each cluster by simple random sampling, and their ANC records were analysed, and data were used for interpretation. We contacted each mother and informed her about the purpose of the present study. All the details of antenatal care visits, Iron Folic Acid supplementation, any complications with detailed obstetric history and birth weight were recorded. Data were entered in the MS office 2010

spreadsheet and Epi Info v7. Data analysis was carried out using SPSS v22. Qualitative data were expressed as the percentage (%), and Pearson's chi-square test was used to find out statistical differences between the study groups. If the expected cell count was < 5 in more than 20% of the cells, then Fisher's exact test was used.To find out the independent association between various risk factors ofmacrosomiabinary logistic regression analysis (stepwise method) was performed. All tests were done at alpha (level significance) of 5%; meansa significant association present if the p-value was less than 0.05.

RESULTS

In the present study, a total of 600 mothers were selected after taking consent, who delivered in the last one year. The response rate was 100%, and there was no drop out in the present study. Among the 600 live births, 18 (3%) babies were overweight. The mean age of mothers in the present study was 26.4±7.8 years. 560 (93.3%) of mothers in the present study were in the middle, lower middle and lower socioeconomic class. While 40 (6.7%) out of total mothers in the present study were in the upper-middle and upper socioeconomic class. The most common risk factor found in the present study was anemic during pregnancy reported in 348 (58%) mothers. The next common risk factor present was hypertension during pregnancy reported in59 (9.8%) mothers. Parity more than and equal to four was seen in 46 (7.6%) mothers and diabetes were found in 45 (7.5%) mothers. Three abortions and stillbirths reported in 31 (5.2%) and 27 (4.5%) mothers respectively. Maternal age ≥40 years present in 24 (4%) participants and foetal mal-presentation reported among 16 (2.6%) mothers and premature birth with congenital malformations reported among 11 (1.8%) mothers. 13 (2.1%) mothers had the height of less than or equal to 145cm (Table 1).

Table 1: Distribution of study participants according to risk factors.

Risk factors	Study participants
Maternal age ≥40 years	24 (4%)
Height ≤145 cm	13 (2.1%)
Parity ≥4	46 (7.6%)
History of ≥3 abortions	31 (5.2%)
Previous stillbirth	27 (4.5%)
Anemia during pregnancy	348 (58%)
Hypertension during pregnancy	59 (9.8%)
Diabetes mellitus during pregnancy	45 (7.5%)
Foetal mal-presentation	16 (2.6%)
Previous birth with congenital malformations	11 (1.8%)

In the present study, we found that there was the non-significant association between macrosomia and mother's education, i.e. p-value > 0.05. There were no illiterate in the present study, and maximum numbers of mothers 325 (54.1%) were studied upto middle education. In the present study, we found a significant association between mothers age > 40 years and macrosomia, i.e. p-value <0.05. Out of 24 mothers of age 40 years, 10 (55%) had the macrosomic child. In the present study, we found a significant association between socioeconomic status and macrosomia, i.e. p-value <0.05. Out of 40 mothers of high socioeconomic status 6 (34%) had the macrosomic child. In the present study, we found that there was the non-significant association between macrosomia and mother's height ≤145 cm, i.e. p-value > 0.05. In the present study, we found a significant association between Parity ≥4 and macrosomia, i.e. p-value <0.05. Out of 46 mothers of high Parity ≥4, 6 (34%) had the macrosomic child. A significant association was found between anemia during pregnancy and macrosomia, i.e. p-value <0.05. Out of 348 mothers of anemia during pregnancy, 5 (27.7%) had the macrosomic child. In the present study, we found a non-significant association between macrosomia and three abortions and hypertension

during pregnancy, i.e. p-value > 0.05.A highly significant association was found between diabetes during pregnancy and macrosomia, i.e. p-value <0.001. Out of 45 mothers of diabetes during pregnancy, 11 (61.1%) had the macrosomic child.(Table 2)

Table 2: Association of maternal risk factors and macrosomia.

maternal risk factors	Birth weight ≥4 kg (N=18) (%)	Birth weight ≤4 kg (N=582) (%)	P value
Mother's education			
Illiterate	0	0	0.519
Primary	6 (33.3)	196 (33.7)	
Middle	8 (44.4)	317 (54.4)	
High	3 (16.6)	58 (9.9)	
Graduate and above	1 (5.5)	11 (1.9)	
Mother's age			
≥40 year	10 (55.5)	14 (2.4)	<0.05
Socio-economic status			
Upper+upper middle	6 (34.4)	34 (5.8)	<0.05
Middle+lowermiddle+lower	12 (66.6)	548 (94.1)	
Mother's height ≤145 cm	1 (5.5)	12 (2.1)	.330
Parity ≥4	6 (33.3)	40 (6.8)	<0.05
≥Three abortions	2 (11.1)	29 (5)	.237
Anemia during pregnancy	5 (27.7)	343 (58.9)	<0.05
Hypertension during pregnancy	1 (5.5)	58 (10)	0.457
Diabetes during pregnancy	11 (61.1)	34 (5.8)	p=0.000

DISCUSSION

In the present study, a total of 600 mothers were enrolled for the study after taking consent, who delivered in the last one year. Among the 600 live births, 18 (3%) babies were overweight. The mean age of mothers in the present study was 26.4±7.8 years. 560 (93.3%) of mothers in the present study were in the middle, lower middle and lower socioeconomic class. While 40 (6.7%) out of total mothers in the present study were in the upper-middle and upper socioeconomic class, previous researches reported birth weights more than 4000 gms tried to find out complications in both mother and child (8).A study conducted by Kamanau C et al. reported similar results to present research that the prevalence of macrosomic babies they found was 2.5% of the total infants delivered in their study duration (9).

In the present study maternal age ≥40 years present in 24 (4%) participants and foetal mal-presentation reported among 16 (2.6%) mothers and previous birth with congenital malformations reported among 11 (1.8%) mothers. 13 (2.1%) mothers had the height of less than or equal to 145cm. A study conducted by Bergmann R et al. on the macrosomic child at Berlin reported that mothers agemore than 30 years had a high risk for having macrosomic children than mothersof less than 30 years of age (at 95 % CI)(10). These findings were also supported by a study conducted by Ojule J et al. and they reported that mothers aged more than 30 years were at higher risk for delivering the macrosomic child (11). A study conducted by Stotland N et al. reported similar results to present research that mother's age >40years was associated with macrosomia and it was statistically highly significant (p<0.001). By applying bivariate and multivariate analyses, the association of macrosomia was found with several complications such as birth trauma, postpartum hemorrhage, higher rates of cesarean section, shoulder dystocia, chorioamnionitis, perineal lacerations and prolonged hospital stay (p<0.05)(12).

In the present study, anemia during pregnancy was reported in 348 (58%) mothers. The next common risk factor present was hypertension

during pregnancy reported in 59 (9.8%) mothers. Parity more than and equal to four was seen in 46 (7.6%) mothers and diabetes were found in 45 (7.5%) mothers. ≥Three abortions and stillbirths reported in 31 (5.2%) and 27 (4.5%) mothers respectively. In the present study, we found a significant association between Parity ≥4 and macrosomia, i.e. p-value <0.05. Out of 46 mothers of high Parity ≥4, 6 (34%) had the macrosomic child. A significant association was found between anemia during pregnancy and macrosomia, i.e. p-value <0.05. Out of 348 mothers of anemia during pregnancy, 5 (27.7%) had the macrosomic child. In the present study, we found a non-significant association between macrosomia and ≥three abortions and hypertension during pregnancy, i.e. p-value > 0.05. A highly significant association was found between diabetes during pregnancy and macrosomia, i.e. p-value <0.001. Out of 45 mothers of diabetes during pregnancy, 11 (61.1%) had the macrosomic child. Similar results werefound in a study conducted by Ikeako L et al on maternal risk factors for macrosomia and reported that highly significant association of macrosomia with higher parity (4.2 ± 2.8; P = 0.001), and also substantial association with maternal weight gain till term i.e. (89.23 ± 6.37 kg; P = 0.002). They also reported thatin the study participants, mothers who had the previous history of high birth weight or macrosomic babies, prior history of diabetes shows a significantly higher incidence of cesarian section rate (P = 0.001) than the control group. They also reported that higher incidence of male babies among macrosomic babies and this association was also statistically highly significant (P = 0.001). There were higher rates of shoulder dystocia observed among the macrosomicbabies, and the stillbirth rate was similar in both study and controlgroup(P = 0.124)(13). A study conducted by Jolly M et al. reported a non-significant association of macrosomia with diabetes mellitus, both the previously existing before pregnancy and gestational diabetes. These results were contradictory to the present study (14).

CONCLUSION

We concluded from the present study that macrosomia was significantly associated with maternal diabetes, both the gestational and previously existing. Macrosomia was also associated with mother's age more than 40 years and the parity level of more than 4 children. Macrosomia was also associated with the anemic status of the mother in the present study. Since it was a non-funded study, we took a relatively small sample size, so the results cannot be generalized to the population. Hence, large study needed to know the bigger picture of the cause in the community.

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