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Original Article

Exacerbation of Asthma during Pregnancy: Fetomaternal Outcomes

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Abstract

Background

Asthma is a common occurrence during pregnancy. Exacerbation during pregnancy represents an important and challenging medical problem and may result in poor fetomaternal outcomes. Until now, there are no studies comparing the fetomaternal outcomes in pregnant women with case (asthma) exacerbation and with control group (non-asthma) women of similar age and period of gestation. Therefore, we analysed selected fetomaternal outcomes retrospectively in these group of women.

Material & Methods

This is a retrospective observational comparative study. During the study period, total number of deliveries was 5,568. Women who were admitted with the diagnosis of exacerbation of asthma during pregnancy between 1st Jan 2015 to 31st Dec were included in the study. These cases were compared with random selection of controls who were admitted in the same duration of time for the delivery without asthma after matching maternal age and period of gestation. Ethical clearance was obtained before the study. Fetomaternal outcomes were compared between women with exacerbation of asthma and non-asthma.

Results

One hundred and eight pregnant women from each asthmatic and non-asthmatic group were analysed for selected fetomaternal outcomes. The mean age of asthmatic and non-asthmatic group was 23.2 ± 4.3 and 24.9 ± 3.2 years respectively. LSCS, UTI and preeclampsia were more common in asthmatic women. Birth weight and APGAR score was lower in babies with asthmatic women. Inpatient care and mortality rate were more common in babies of asthmatic women.

Conclusion

Exacerbation of asthma during pregnancy may result in poor fetomaternal outcome. Therefore, a more careful monitoring of women with exacerbation of asthma during pregnancy and delivery is required.

Keywords: Asthma exacerbation, Pregnancy, Fetomaternal outcomes

Introduction

Asthma is a common medical problem in during pregnancy. It occurs in 3-12% of all pregnancies and the prevalence is rising. Exacerbation is frequent during pregnancy

and may be related to poor pregnancy outcomes [1]. There is increased risk of pre-eclampsia, gestational diabetes; placental abruption and placenta praevia in pregnant women with exacerbations of

asthma. These women also have higher risk for breech presentation, haemorrhage, pulmonary embolism, caesarean delivery, increased intensive care unit admission and longer hospital stay [2-3]. Moderate to severe chronic asthma may be associated with increased risk of intrauterine growth retardation, small-for-gestational age, low birth weight, neonatal hypoglycaemia and preterm birth and low APGAR score [4-5]. Therefore, asthma exacerbations during pregnancy may be associated with poor fetomaternal outcomes. There are no studies comparing fetomaternal outcomes between asthma exacerbation (case) and no-asthma (control) women with pregnancy. Different studies show conflicting results on the effects of acute asthma exacerbation in pregnancy and perinatal outcomes [6]. Therefore, we carried out this retrospective analysis to see the effect of asthma exacerbation in fetomaternal outcomes in these two group of women in our setting.

Material and Methods

A retrospective observational comparative study was conducted in Nobel Medical College in eastern Nepal. Women who were admitted with diagnosis of exacerbation of asthma during pregnancy during the year 1st Jan 2014 to 31st Dec were included in the study. These cases were compared with random selection of controls who were admitted in the same duration for the delivery without asthma after matching maternal age and period of gestation. Institutional Ethical clearance was taken before the data collection. Maternal outcomes studied were period of gestation at the time of exacerbation of asthma, mode of delivery, association with preeclampsia and, urinary tract infection. Neonatal outcomes measures were period of gestation at the time of delivery, birth weight, APGAR Score and NICU admission. The collected data was entered in MS Office excel 2007 and later the file was

converted into SPSS 11.5 version software. Frequency and percentage were calculated for categorical data and mean \pm SD was calculated for numeric data. Chi-square test and t-test were used to find out significance of the variables. Odds ratio with its confidence interval was calculated to find out the strength of association. P value less than 0.05 was considered as significant at 95% confidence interval.

Results

A total of 108 pregnant asthmatic women with acute exacerbation and 108 pregnant non-asthmatic women were studied for maternal and neonatal outcomes. The mean age of asthmatic and non-asthmatic group was 23.2 ± 4.3 and 24.9 ± 3.2 years respectively. The pre-delivery mean hemoglobin level (asthmatics = 10.10 gm% & non-asthmatic = 9.50 gm%) was also found to be nearly equal between the two groups. Out of 108 asthmatics 73 were multigravida. Mean period of gestation at the time of exacerbation was 27 weeks of gestation.

Table 1 Maternal outcomes

Characteristics		Asthma n-108	Non-Asthma n-108	OR (95%CI)	P
		n (%)	n (%)		
Labour	Spontaneous	73(67.59)	59 (54.6)	1.00	Reference
	Elective	19(17.59)	27 (25)	0.57 (0.27-1.18)	0.102
	Induced	16(14.81)	22 (20.37)	0.59 (0.27-1.29)	0.151
Mode of Delivery	Vaginal	65(60.18)	70(64.81)	1.00	Reference
	Instrumental	3(2.77)	2 (1.85)	1.62(0.21-14.34)	0.603
	LSCS	21(19.44)	9(8.33)	2.51 (1.00-6.43)	0.030
Associated disease	UTI	37 (34.25)	11(10.18)	1.00	Reference
	Preeclampsia	11(10.18)	9(8.33)	0.36 (0.10-1.26)	0.068

More women with asthma had spontaneous labor. LSCS, UTI and preeclampsia were more common in asthmatic women.

Table 2 Neonatal outcome

Characteristics	Asthma group	Non-asthma group	t-value / OR (95% CI)	p-value	
	n (%)	n (%)			
Mean POG at the time of delivery, Mean \pm SD	37.63 \pm 4.02	38.92 \pm 4.02	2.36	0.019	
APGAR score in 5 min, Mean \pm SD	7.58 \pm 1.23	7.92 \pm 0.88	2.34	0.021	
Birth weight(kg)					
Mean \pm SD (kg)	2.44 \pm 0.37	2.68 \pm 0.49	4.06	< 0.001	
Sex	Male	39(36.1)	58(53.70)	1.00	Reference
	Female	69(63.9)	50(46.29)	2.05 (1.15 - 3.68)	
Admission	No admission	78(72.22)	89(82.40)	1.00	0.236
	Ward admission	17(15.74)	12(11.11)	1.62 (0.68 - 3.87)	
	NICU admission	13(12.03)	7(6.48)	2.12 (0.74 - 6.22)	
Outcome	Living	101(93.51)	105(97.22)	1.00	Reference
	Neonatal death	7(6.48)	3(2.77)	2.43 (0.55 - 12.21)	

Mean POG at the time of delivery was lower in asthmatic women. Birth weight and APGAR score was lower in babies with asthmatic women. Inpatient care and mortality rate were more common in babies of asthmatic women.

Out of 13 babies admitted in NICU, 3 babies were admitted for respiratory distress syndrome, 4 babies were admitted for severe birth asphyxia, 3 babies for prematurity supportive care and rest 3 for meconium aspiration syndrome. However, in non-asthmatic group Out of 7 admitted neonate 4 were admitted for respiratory

syndrome, 2 for neonatal sepsis and one for neonatal jaundice. While analysing neonatal mortality in asthmatic group out of 3 preterm 2 died, 3 baby died of severe birth asphyxia and one of meconium aspiration syndrome. In non-asthmatic group 2 babies died of sepsis and one died of congenital pneumonia.

Discussion

The prevalence of asthma during pregnancy is found to be 2 % in the present study. There are only few published data about the prevalence of asthma during pregnancy. In a multicentre study by Agrawal et al [9] the overall prevalence of asthma was 2.56%. In this study, we analysed selected maternal and neonatal outcomes in women who had exacerbation of asthma during pregnancy in a tertiary care center of Nepal. Exacerbation can occur at any time during pregnancy but tend to occur more commonly during late second trimester [7] which is compatible with our study where mean gestational age for exacerbation was 27 weeks POG. However, a recent multicenter study done by Schaz M et al [8] found 46% exacerbation during labour. Out of 108 women, viral infection was associated in 32 (29.62%) women but in 20(18.51%) women discontinuation of regular treatment taken before pregnancy was the aggravating factor where as in rest 56(51.85%), no obvious aggravating factors was noted. In our study, we found that 37(34.25%) asthmatic women had urinary tract infection whereas in control it was 11(10.1%). Pregnant women may be more susceptible to various infection because of changes in cell mediated immunity which may lead to exacerbation of asthma during pregnancy. One study showed that pregnant women with asthma were more likely to have urinary tract infection during pregnancy (35%) than pregnant women without asthma (5%) [10].

Stenius-Aarniala et al [1] found that preeclampsia was three times higher in pregnant women who were hospitalized for asthma than in women who did not experience an exacerbation during pregnancy. However, our study did not find significant difference in incidence of preeclampsia in asthmatic and non asthmatic group. Similar observation was noted in a case-control study by Martel et al [11] where exacerbations during pregnancy had no significant effect on the risk of pre-eclampsia.

Regarding mode of delivery 21(19.4%) patient underwent LSCS in asthmatic group where as in non-asthmatic group it was 9 (8.3%). While analyzing indication of LSCS in asthmatic group, fetal distress in 15(71.4%), non descent of head in active stage of labour in 4(19.0%) ,and prolonged second stage of labour in 2(9.5%) . However, in non asthmatic group NPOL was the most common indication in 6 (66.7%) and in 3(33.3%) the patient had undergone LSCS for fetal bradycardia and late deceleration in CTG in active stage of labour. Higher rate of cesarean section was also observed with most previous studies [12-13]. Another study done by Gustaf Rejno et al had a significant association between maternal asthma and emergency cesarean section (adj OR 1.29;95% CI 1.23-1.34) [14].

In our study we found that 11(10.1%) of asthmatic women and 9(8.3%) non asthma had antepartum haemorrhage which is consistent with finding of Meena BL et al [15].

The effect of asthma exacerbations on reduced fetal growth is independent of any changes in gestational age at delivery. Several studies which reported reduced birth weight among mothers with exacerbations during pregnancy did not find any increase in the rate of preterm delivery [16]. However, in our study where mean period of gestation at the time of

delivery was 37.63 weeks in asthmatic group whereas in non asthmatic group it was 38.92 weeks which is statistically significant. Increased risk of Preterm delivery in women with asthma is due to similarities between bronchial and uterine smooth muscle hyper responsiveness [17]. Asthma if well controlled does not significantly affect the outcome of pregnancy and labour. Asthmatic women who decrease their medication during pregnancy have low birth weight babies. , lower mean gestational age at the time of delivery when compared with non asthmatic women or asthmatic females who increase their medication level during pregnancy. Thus asthma control, severity and medications do affect outcomes [18]. However asthma severity was not taken into account in our study as it was a retrospective study.

There are conflicting results regarding the impact of asthma on pregnancy . Studies indicate association of disease with low APGAR score and or intrauterine growth restricted newborns in addition to prematurity, especially related to the severity of the disease [19]. However, in meta-analysis performed by Murphy et al, no increased risk was verified for the adverse events [20]. The present study also verifies association between the asthma and adverse perinatal outcomes in certain parameters i.e. low APGAR score and birth weight. We also found asthma exacerbation was more commonly found in a woman carrying female fetus. The mechanism for exacerbation of fetal sex on asthma severity during pregnancy remains controversial. In developing male fetuses, testosterone is secreted from 8 weeks onward; testosterone level peaks at 12–16 weeks and then decreases to a low level in late gestation [21]. Testosterone potentiates b-adrenergic-mediated relaxation of bronchial tissue and inhibits response to histamine. Hence, asthmatic

women with male fetuses may experience a protective effect, particularly from the second trimester onward. Alternatively, recent studies suggest that sex-specific factors related to the presence of a female fetus may promote activation of inflammatory pathways associated with asthma in the maternal system [22].

Conclusion

Maternal asthma is associated with serious pregnancy complication and adverse perinatal outcomes. Therefore, a more careful monitoring of women with exacerbation of asthma during pregnancy and delivery is required. Future large community based studies are advised in this region of Nepal.

Limitation

The limitations of this study include the restricted number of cases using hospital based data, assessment and difficulty in obtaining information due to the retrospective nature of the study.

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