

Maternal Comorbidities Associated with Preterm Deliveries in Comparison with Full Term Delivery in Al-Zahraa Teaching Hospital in Al Najaf City

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Abstract

Background: Preterm birth is one of the major conditions that affect on infant mortality and morbidity, many of maternal comorbidities effect on the fetus outcome, in this study we evaluate some of maternal condition that effect on preterm birth and compare them with full term birth to know the most common factors associated with this condition to decrease the rate of preterm birth and reduce neonatal mortality and morbidity

Methods: A case control study was conducted at first of April to thirty of September 2018, in Al Zahra Teaching Hospital in Al Najaf City, 300 delivered pregnant women were participated divided to 100 cases as preterm delivery women and 200 controls as full term deliver women enrolled in the study, maternal comorbidities were recorded and binary regression analysis was used for analysis of the study.

Results: The study show many significant association between preterm birth and maternal risk factors include, urinary tract infection (OR = 7.32), lower number of antenatal visit (OR=2.52), interval between pregnancy ≤ 2 year (OR =1.973), premature rupture of membrane (or =6.55), oligohydramnios (OR =6.55), gestational diabetes (OR =3.45), abruptio placentae (OR = 5.06) and previous preterm labor (OR=3.68).

Conclusion: Based on the results in the study the most determinants that affect on preterm birth were urinary tract infection, premature rupture of membrane and abruptio placenta.

Keywords: *Antepartum hemorrhage, Gestational Diabetes mellitus, Gestational Hypertension, Premature rupture of membrane, Preterm birth, maternal comorbidities, fetus outcome, oligohydramnios, abruptio placentae*

Introduction

Preterm delivery defined by The World Health Organization (WHO) as infant delivered at time below 37 completed weeks of gestation. It was divided into the

following categories depending on mother gestational age, extremely preterm (<28 weeks), very preterm (28–<32 weeks), moderate or late preterm (32–<37 completed weeks of gestation [1].

An about fifteen million babies are deliver too early every year. Nearly one million children die every year because of the complications of preterm birth [2].

Preterm birth (PTB) considered as a major cause of morbidity and mortality and its percentage are increasing with time in many countries [3, 4].

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The majority of global preterm births occur in Asia and Africa with (85%), where the health systems are inadequate and weak [5, 6].

The rate of mortality, morbidity and the costs of Preterm labor are higher at lower gestational ages, in babies that survive, the risk is rise in form of short – and long term morbidity [7,8].

Obesity may not directly lead to preterm birth [9] however; it may associate with diabetes and hypertension which are risk factors by them [8]. Marital status is also associated with risk for preterm birth [10]. Pregnancy outside of marital status was associated with a 20% rise in adverse outcomes. [11]

Subfertility is another factor associated with preterm birth, Pregnancies after used in vitro fertilization confers a high risk of preterm birth after more than 1 year of trying [12].

A number of systemic maternal bacterial infections are associated with preterm birth this including pneumonia, appendicitis, pyelonephritis [13].

In study done in Iraq showed that risk of preterm birth increase with history of multiple pregnancy with (OR=7.5), history of cervical incompetence with (OR=4.7), and history of abortion with (OR=6.3) in comparison with pregnant women did not had previous history to such condition, heavy manual work with (OR = 1.70), and direct trauma to the abdomen (OR = 3.76) were also significantly associated with preterm birth [14].

A study done in Iran to measure risk factors of preterm birth found that history of preterm rupture of membrane, preeclampsia, and multiple pregnancies had increased risk of preterm birth with odd ratio equal 5.1, 4.6, and 17.4 respectively. In the same study the investigator found history of infertility and previous history of abortion were not statistically significant with preterm birth. [15]

Another studies done in Ethiopia revealed that many factors associated with preterm birth include preterm rupture of membrane, maternal age more than 35 years old , poor antenatal care, and infection of pregnant women with HIV [16,17].

A case–control study done in western part of China appeared that number of antenatal care four or less are more significantly associated with preterm birth with (OR=4) in relation to pregnant with adequate antenatal visit, while income of family, age of pregnant mother, and level of education were not significantly associated with preterm birth [18].

In Northwestern Russia study was investigate associations between preterm birth and selected maternal factors and found young pregnant with age (<18 years) or older (≥35 years) , underweight , obese mothers, smoking status, abuse of alcohol and history of diabetes mellitus or gestational diabetes were more likely associated with preterm birth [19].

Approximately 45–50% of preterm deliveries are without cause, 30% are caused by (PROM) and other 15–20% is due to indicated or elective preterm deliveries. [20]

Although many years of research to determine the etiology, epidemiology, and management of preterm birth. The incidence of it has continued to increase. There are a lot of hypothesis found to explain the increase in preterm as a technology of assisted reproduction and the desire of obstetricians to use elective delivery of infant of pregnant in whom medical, fetal, or obstetrical complications happen preterm [21, 22, 23, 24].

Subjects and Methods:

Study design:

A case control study.

Study setting and time:

Study was carried out in Al Najaf city and data were collected from post delivery ward in Al-Zahraa Teaching Hospital which is a major teaching and referral hospital for obstetrics and gynecology receive pregnant from central and peripheral area, handles with uncomplicated and complicated deliveries , data collected in period between 1st of April 2018 to 30th of September 2018.

Sample size:

To achieve the aim of the study, a case control study use with sample size calculated according to equation below:

$$\text{Sample size} = \frac{r+1 (P^*)(1-P^*)(Z_{\beta}+Z_{\alpha/2})^2}{r (P_1-P_2)^2}$$

Data collection:

The inclusion criteria include:

- Female at reproductive age 15-45 years.
- Singleton pregnancy determined by ultrasound.
- Pregnant know her LMP or had U/S at 1st trimester.

Exclusion from this study:

- Multiple gestations.
- Those who are using assisted conception.

Statistical Analysis

Data were entered, and analyzed using the statistical package for social sciences SPSS version 25.

Results

The parity of the women in both study groups showed no significant association between both groups, 34% vs. 26.5%, respectively in nulliparous women, and 66% vs.73.5% respectively in multiparous women (P=

0.224) with CI 95% of OR=(0.84 - 2.40).

The interval between pregnancies was 2 years or less in 44 women (66.7%) out of the 66 parous women (parity one or more) in preterm group and it was more than 2 years in the remaining 22 (33.3%), while the corresponding frequencies in the term group were 74 (50.3%) and 73 (49.7%) out of 147 parous women in this group respectively, statistically significant difference had been found (P= 0.027) (OR=1.97). History of preterm labor was significantly frequent in preterm than term group, 24.2% and 12.9%, respectively, (P=0.039) with (OR=2.15).

Previous cesarean sections (CS) was not significantly different between studied groups, 37.9% in preterm and 36.1% in term group, (P>0.05), CI 95% of OR=(0.59 - 1.97).

Number of antenatal visit was significantly lower in preterm than term group (P=0.037) where 21% of women in preterm had no antenatal visit compared to only 14% in the term group, additionally, 35 women (35%) in the preterm group had 1-3 visit compared to 58 (26.5%) in the term group while 44% preterm women and 59.5% term women had 4 or more visits. All findings regarding the obstetrical history of the studied groups are demonstrated in (Table 1).

Table 1. Obstetrical history of the studied groups

Variable		Preterm (N=100)		Term (N=200)		P. value	OR	CI 95%
		No.	%	No.	%			
Parity	Nulliparous	34	34.0	53	26.5	0.224	1.42	0.84 - 2.40
	Multiparous	66	66.0	147	73.5			
Interval between pregnancies*	≤ 2year	44	66.7	74	50.3	0.027	1.97	1.07 - 3.61
	>2year	22	33.3	73	49.7			
Previous preterm labour	Yes	16	24.2	19	12.9	0.039	2.15	1.02 - 4.52
	No	50	75.8	128	87.1			
Previous CS	Yes	25	37.9	53	36.1	0.798	1.08	0.59 - 1.97
	No	41	62.1	94	63.9			
Number of antenatal visit	None	21	21.0	28	14.0	0.037		
	1-3	35	35.0	53	26.5			
	4 and more	44	44.0	119	59.5			
*Primi women were excluded from calculation								

In (Table 2) no significant differences had been observed between both groups regarding the mode of delivery or the sex of the neonate, ($P>0.05$) with CI 95% of OR= (0.75 - 2.02) and (0.41 - 1.08) respectively. Furthermore, all neonates in preterm group had birth weight of < 2500 gm. compared to only 6 (3%) in term group with a statistically significant difference ($P<0.001$).

Table 2. Mode of delivery and neonatal characteristics of the studied group

Variable		Preterm (N=100)		Term (N=200)		P. value	OR	CI 95%
		No	%	No.	%			
Mode of delivery	CS	41	41.0	72	36.0	0.399	1.23	0.75 - 2.02
	VD	59	59.0	128	64.0			
Sex of neonate	Male	48	48.0	116	58.0	0.101	0.66	0.41 - 1.08
	Female	52	52.0	84	42.0			
Weight of neonate (gram)	< 2500	100	100.0	6	3.0	< 0.001		
	≥ 2500	0	0	194	97			

Table 3 shows the comorbidities reported in both studied groups; where no statistically significant differences had been found in the frequency of chronic hypertension; 3% vs. 1.5%, ($P>0.05$), CI 95% of OR=(0.46 - 11.76) , gestational hypertension found in 14% and 11% of preterm and term groups, respectively, ($P>0.05$), CI 95% of OR=(0.72 - 3.04). Preeclampsia/eclampsia status was significantly more frequent in preterm group, (8%) compared to only (0.5%) in term group ($P = 0.001$) with (OR=18.56). Presence of cardiovascular disease was not significantly different between the studied groups, ($P>0.05$). Preexisting diabetes mellitus was not significantly different between both groups, ($P>0.05$), CI 95% of OR= (0.11 - 13.14), while gestational diabetes mellitus was significantly more frequent in preterm group (19%) than term group (10%), ($P=0.001$) with (OR=4.46). Frequencies of thyroid diseases and anemia were not significantly different between both groups ($P >0.05$) , CI 95% of OR= (0.22 - 8.33) and (0.67 to 1.76) for hypothyroidism and anemia respectively. Frequency of antepartum hemorrhage due to abruptio placentae was significantly higher in preterm than term group; 27%

vs. 6%, ($P=< 0.001$) (OR=6.07) , APH due to placenta previa was not significantly different between groups, 7% in preterm and 5% in term group ($P>0.05$), CI 95% of OR=(0.69 - 5.16). Preterm rupture of membrane was significantly more frequently occurred in preterm group, (25%) than in term group (1.5%) ($P<0.001$) (OR=21.89). Polyhydramnios amniotic fluid status was not significantly different between both groups ($P>0.05$), CI 95% of OR= (0.56 - 6.39) while oligohydramnios was significantly more frequent in preterm than term group, 15% vs. 6%, respectively ($P = 0.016$) (OR=2.48).

Cervical incompetence was significantly more frequent in preterm group, (11%) compared to only 3% in term group, ($P=0.005$) (OR=4). Uterine abnormalities were not significantly frequent in preterm compared to term group, 2% vs. none, respectively ($P=0.209$). No significant difference between both groups in the presence of genital infection ($P>0.05$), CI 95% of OR= (0.57 - 1.49). Finally, higher proportion, 62%, of women in preterm group had (UTI) compared to 21.5% among women in term group, the difference was statistically significant, ($P<0.001$) (OR=5.96).

Table 3. Comorbidities reported among the studied group

Variable				Term (N=200)		P. value	OR	CI 95% of OR
		No.	%	No.	%			
Hypertension	Chronic	3	3	3	1.5	0.56	2.32	0.46 - 11.76
	Gestational	14	14	22	11	0.38	1.48	0.72 - 3.04
	Preeclampsia/eclampsia	8	8	1	0.5	0.001	18.56	2.28 - 151.03
	None*	75	75	174	87		-	-
Cardiovascular disease	Yes	1	1	0	0	0.157	-	-
	No	99	99	200	100		-	-
Diabetes mellitus	Preexisting	1	1	2	1	0.61	1.18	0.11 - 13.14
	Gestational	19	19	10	5	0.002	4.46	1.99 - 10.03
	None*	80	80	188	94	*	*	*
Thyroid disease	Hyperthyroidism	2	2	0	0	0.21	-	-
	Hypothyroidism	2	2	3	1.5	0.89	1.37	0.22 - 8.33
	None*	96	96	197	98.5	*	*	*
Anemia	<11gm/dl	56	56	108	54	0.734	1.08	0.67 to 1.76
	≥11gm/dl	44	44	92	46			
APH	Abruptio placentae	27	27	12	6	< 0.001	6.07	2.91 - 12.67
	Placenta previa	7	7	10	5	0.329	1.89	0.69 - 5.16
	None*	66	66	178	89	*	*	*
Preterm rupture of membrane	Yes	25	25	3	1.5	< 0.001	21.89	6.42 - 74.64
	No	75	75	197	98.5			
Amniotic fluid	Polyhydramnios	5	5	6	3	0.474	1.9	0.56 - 6.39
	Oligohydramnios	15	15	12	6	0.016	2.84	1.27 - 6.35
	Normal**	80	80	182	91	*	*	*
Cervical incompetence	Yes	11	11	6	3	0.005	4.00	1.44 - 11.15
	No	89	89	194	97			
Uterine abnormality	Yes	2	2	0	0	0.209	10.17	0.49 - 214.04
	No	98	98	200	100			
Genital infection	Yes	44	44	92	46	0.734	0.92	0.57 - 1.49
	No	56	56	108	54			
UTI	Yes	62	62	43	21.5	< 0.001	5.96	3.52 - 10.10
	No	38	38	157	78.5			

*None used as a reference subgroup in comparison **normal used as reference subgroup

Further analysis had been performed to assess the predictor factors of preterm labors, therefore, the factors

that appeared to be significantly different between both groups were entered as independent factors (covariates) in the bivariate regression analysis, and the status of birth (term or preterm) used as dependent variable and the test was run. Results of binary regression analysis and odds ratio (OR) are shown in (Table 4), where eight factors still significant and were the predictors associated with preterm labor after adjustment of other variables; these

are interval between pregnancies less than 2year (OR = 1.973), previous preterm labor (OR= 3.68), lower no. of antenatal visit (OR =2.52), gestational diabetes mellitus (OR = 3.45), Abruptio placentae (OR = 5.06), preterm rupture of membrane (OR =6.55), oligohydramnios (OR = 3.53) and urinary infection (OR = 7.32) , in all these factors, (P<0.05). Other factors showed no significant association (P>0.05).

Table 4. Results of binary regression analysis for the maternal factors associated with preterm labor

Variable in the regression equation	B	Odds ratio (OR)	95% C.I. for (OR)		P. value
			Lower	Upper	
Interval between pregnancies (shorter)	0.680	1.973	1.077	3.614	0.028
Previous preterm labour	1.302	3.68	1.21	11.20	0.022
Lower no. of antenatal visit	0.926	2.52	1.46	4.37	0.001
Hypertension /preeclampsia-eclampsia	0.344	1.41	0.72	2.23	0.246
gestational DM	1.239	3.45	1.17	10.22	0.025
Abruptio placentae	1.622	5.06	2.48	10.34	0.001
Premature rupture membrane	1.879	6.55	1.34	32.06	0.020
Oligohydramnios	1.262	3.53	1.43	8.74	0.006
Cervical incompetence	0.259	1.30	0.21	8.04	0.781
Urinary tract infection	1.990	7.32	2.97	18.04	0.001

Discussion

In current study there is no significant association between PTB and parity , similar result present in Iraq [14], other study done in Iran had different result[25]. Also study done in Cairo found mothers with first baby had higher risk of preterm birth with (p=0.018) [26]. other study done on preterm births which found that nulliparity is an important risk factor for preterm delivery in South Nigeria [27]. The discrepancy of finding in different countries may be attributed to the difference of the factors between the countries.

Interval between pregnancies of ≤ 2 year was found 2 fold more likely to cause PTB. This agree with study in Iran [25], these presentation may suggest that increase spacing between pregnancies could help to prevent the adverse pregnancy outcomes[28], while in Palestine no association present between PTB and interval between pregnancy[29].

The study also revealed a significant association of cervical incompetence and previous preterm delivery to cause PTB and this agree with study done in Palestine [29], and this could be the fact that the cervix is unable to maintain pregnancy to term.

In this study there is a significant association between number of antenatal visit (no visit) and the PTB in which 21% of preterm mother had no antenatal visit in comparison with 10% of full term mother, this agree with study done in Iran, with (p0.036) [25]. In a study done in Nigeria on the determination of preterm births, no booking of pregnant women in antenatal care program was found to be one of the strong determinants^[30], while different result present in Kenya that found no association with preterm birth and attendance to antenatal care (p=0.621)^[31].

The current study also investigate the possible association of preterm birth and history of HTN, in which preeclampsia/eclampsia was 19 fold more likely to cause PTB, while chronic and gestational hypertension not significantly associated with PTB, this agree with result in Iran found that the risk of preterm labor in mothers suffering from preeclampsia is 4.6 times higher than in other mothers^[32]. Also other study in Tehran found preeclampsia and gestational HTN strongly associated with preterm birth^[33]. Study done in japan demonstrated that the risk of preterm labor is higher in mothers suffering from preeclampsia or chronic hypertension^[34]. The chronic and gestational HTN not appear as a risk factor this may attributed to well control of HTN in participant women.

In this study, from a statistical significance viewpoint, anemia was not associated with PTB p-value= (0.734), this agree with study in Palestine (p value=1.0)^[29], also with study in Iran (P= 0.47) [25]. Disagreement appears in study done in Ethiopia^[35] and in Cairo^[26], the difference in significance of result may be attributed to degree of severity of anemia in studied women.

Previous cesarean section not significantly associated with pregnancy outcome (p=0.798), regarding to uterine abnormality, in this study was no statistically significant (P < 0.209) with PTB, and this result different from study done in Tehran^[33]. Also no significant association between cardiovascular disease with (p=0.157) and thyroid disease (hyperthyroidism, hypothyroidism) with (p=0.208, p=0.889) respectively and pre term birth. No association in these factors may be due to need larger sample and more early investigations and fellow up.

The effect of gestational diabetes, it 4 fold increase risk related to preterm outcome p(0.001) while preexisting

diabetes not significantly associated with preterm birth with (p=0.618). This agree with study done in china, found GDM is a significant risk factor with (OR=3.441)^[36], and disagree with study done in Frances that found, pre-existing diabetes was strongly associated with PTB as a comparison with gestational diabetes^[37]. In study done in al Mosul, no significant association present between diabetes mellitus and preterm birth^[14]. In this study the preexisting diabetes not a risk factor, this my due to small number of participants detected .

Regarding antepartum hemorrhage the study found a significant association between placental abruption with preterm delivery, in contrast with placenta previa in relation with preterm delivery. Results also agree with study done in Iran that found no significant association between placenta previa and preterm birth^[25]. Other study done in Palestine appeared that placenta abruption and placenta previa were found to be a significant risk factors for preterm birth^[29]. In Nigeria study found a complication of pregnancy including antepartum hemorrhage was significantly associated with preterm birth^[38]. Other research in Mosul reported that antepartum hemorrhage was not considered as a risk factor for preterm birth^[14]. Placenta previa not significantly affect preterm this may attributed to the type of placenta previa like in study done by Dola et al. Found that preterm birth was more happened in pregnant women with complete placenta previa^[39].

Conclusion

- Maternal Urinary tract infection is a significant factor effecting PTB, fellow by PROM and abruptio placentae.

- There is a strong association between preterm birth and oligohydramnios, gestational DM, no antenatal visit, previous preterm labor and short interval between pregnancies.

Ethical Clearance- Taken from The Institution's Ethical Committee approval

Source of Funding- Self

Conflict of Interest – nil

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