

ASSESSMENT OF RISK FACTORS FOR PRETERM BIRTH: CASE CONTROL STUDY ⁺

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Abstract :

World Health Organization defines preterm birth as a gestational age at birth of less than 37 completed gestational weeks. Preterm birth is recognized as a major public health problem by both clinicians and researchers because it is the leading cause of infant mortality.

The aim of the present study is to determine factors, which cause or associate with the development of preterm birth and permit identifying pregnant women who are at high risk in the development of preterm birth.

A case-control study design to compare 209 preterm birth women with 418 controls selected according to the method of unpaired sampling from Al-Elwaya pediatric hospital and central child teaching hospital in Baghdad during (1st June to 30th Septembers 2011).

High-risk association was observed between preterm birth and pregnancy at older age groups 40-49 years, while lowest – risk at young age 20-29 years. The illiteracy rate was higher among this study (25.8% and about 13.9% compared to control. Several significant risk associations between preterm birth and the following risk factors were identified: hypertension (OR=8.7), diabetes mellitus (OR=7.03), urinary tract infection (OR = 11.60) and <1 visit of primary health care (OR = 2.5).

Conclusion show that the factors that might be related to preterm birth was (occupation, parity, birth space interval and twin delivery).

Key words: Preterm birth, birth space interval, control, abortion, BMI

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المستخلص:

عرفت منظمة الصحة العالمية الولادة المسبقة باعتبارها ولادة قبل ال 37 أسبوع والولادة المسبقة تعتبر مشكلة صحية عامة رئيسية من قبل الأطباء والباحثين على حد سواء لأنه هو السبب الرئيسي في وفيات الرضع.

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الهدف من هذه الدراسة هو تحديد العوامل التي تسبب ولادة مسبقة وتمكن تمييز النساء الحوامل ذات الخطورة العالية للولادات المسبقة

وهي دراسة حالات وشواهد حيث تم اختيار 209 حالة من حالات الولادة المسبقة مع عينة ضابطة مكونة من 418 من ذوات الولادات الطبيعية حيث تم جمعهم حسب العينة المزدوجة مع التطابق الفردي في مستشفى العلوية للاطفال ومستشفى الطفل المركزي في بغداد (الاول من حزيران الى الثلاثين من تشرين الاول 2011)

ان الخطورة العالية لحدوث ولادة مسبقة كانت في الاعمار المتقدمة من (40-49) سنة بينما كانت اقل في الاعمار التي تتراوح ما بين (20-29) سنة. قلة المستوى التعليمي كان مرتفع في (25.8%) (الولادات المسبقة ومقارنة ب 13.9% مع النساء اللواتي ينجبن طفل طبيعي. اظهرت النتائج ايضا وجود علاقة كبيرة بين الولادة المبكرة وعوامل الخطورة عرفت ب : ارتفاع ضغط الدم ($OR = 8.7$)، داء السكري ($OR = 7.03$)، التهاب المسالك البولية ($OR = 11.60$) وقلة الزيارات لمراكز الرعاية الصحية الأولية ($OR = 2.5$).

أظهرت الاستنتاجات ان العوامل التي لها علاقة بالولادة المسبقة هي (المهنة , عدد مرات الولادة فترة المباشرة بين حمل وآخر وولادة التوائم)

Introduction:

Pre-term birth (PTB) is a major determinant of neonatal mortality, morbidity and childhood disability and remains one of the most serious problems in obstetrics [1].

Preterm birth (PTB) refers to the birth of a baby that occurs before 37 completed weeks of gestation. PTB can be further sub-categorized as late preterm delivery- 34 to 36 completed weeks gestation, moderately preterm- 32 to 34 completed weeks, very preterm- less than 32 weeks, and extremely preterm- less than 28 weeks gestation [1]. Despite major preventive efforts, the incidence of PTB has remained constant at about 5–10% of live births in most countries over the past two decades [2, 3]. Studies from Iraq revealed an increasing preterm deliveries [4] Preterm birth is an increasingly common complex condition with multiple risk factors [5] and has substantial medical, psychological, economic and social impacts. It is the leading cause of infant mortality in the United States. Compared with term neonates, mortality rates for preterm (less than 37 weeks) and very preterm infants (less than 32 weeks) are 15-fold and 75-fold higher respectively [6].

Obstetric risk factors associated with PTB include: cervical incompetence, multiple gestations, short birth intervals, abortion, pre-labor premature rupture of membrane (PPROM) and previous PTB [7].

A number of other medical conditions have also been associated with PTB including: Diabetes mellitus, urinary and genital tract infections and psychological stress [8].

Aim of the study :

To identify risk factors of preterm birth and to find the relationship between preterm birth and some variables as (age, education, occupation and no. of visits).

Methods:

A case-control study design was used. Cases were defined as pregnant women with a live PTB (29 – <37 weeks) by vaginal delivery or caesarean section. Controls were defined as pregnant women admitted to the same hospitals with a full-term live birth (≤ 37 weeks) by vaginal delivery or caesarean section.

The study was conducted in Al-Elwaya and central child teaching hospital. The sample was selected (non probability convenient sampling) which include 209 cases of preterm delivery and 418 controls

The study has started from 1st June to 30th September 2011. The data were collected by direct interview using special questionnaire. Information included socio demographic data (age, education and occupation), obstetrical history (twin, birth space interval, abortion and parity) and chronic disease.

Interview of women who had normal delivery was after five hours of birth, while women who delivery by caesarean birth interview was done the next day after birth.

Odds Ratios (OR) and 95% Confidence Intervals (CI) for the OR were calculated. The dependent variable of the logistic regression was the presence or absence of PTB. A stepwise forward logistic regression was used. All variables were included in the initial analysis; the variable with the strongest association was estimated first, followed by all significant variables.

Result :

Table 1:- Distribution of sample according to age, education and occupation

Variables	Cases (209)		Control (418)		OR	(95% C1)	p. value
Age (years)	No.	%	No.	%			0.000
≤20	49	23.4%	42	10.1%	2.7417	(1.7451 - 4.3074)	
20-29	93	44.5%	236	56.5%	0.4219	(0.3069 – 0.58)	
30-39	40	19.1%	128	30.6%	0.5362	(0.3585 – 0.8019)	
40-49	27	13%	12	2.8%	5.0192	(2.4872- 10.129)	
Occupation							0.041
Working	84	40.2%	204	48.8%	0.7049	(0.5035-0.9869)	
Housewives	125	59.8%	214	51.2%			
Education							0.000
Illiterate	54	25.8%	58	13.9%	2.0313	(1.3428-3.0728)	
Primary	44	21.1%	98	23.4%	0.821	(0.55-1.2255)	
Secondary	86	41.1%	170	40.7%	1.02	(0.7277-1.4296)	
University	25	12%	92	22%	0.4815	(0.2987- 0.7763)	

[Table1](#) shows that there is a high-risk association was observed between PTB and pregnancy at older age groups 40-49 years, with an OR = 5.019 while lowest risk at young age =20-29 years, with an OR = 0.42. all study subjects were housewives. A significant association was present between PTB and illiteracy education (OR = 2.03), followed by secondary education (OR=1.02).

Table (2) Distribution of sample according to obstetric history

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Variables	Cases (209)		Control (418)		OR	(95% C1)	p. value
Parity							0.000
1	8	3.8%	96	23%	0.1335	(0.0635-0.2805)	
2	120	57.4%	194	46.4%	1.5568	(1.1138-2.176)	
3	43	20.6%	96	23%	0.8689	(0.5792-1.3034)	
>4	38	18.2%	32	7.9%	2.6806	(1.6201-4.4353)	
birth space interval (years)							0.000
<1	100	47.9%	72	17.2%	4.4088	(3.0403-6.3933)	
1	43	20.5%	98	23.5%	0.8458	(0.5644-1.2676)	
2	13	6.2%	76	18.2%	0.2985	(0.1616-0.5515)	
≥3	53	25.4%	172	41.1%	0.4859	(0.3365-0.7017)	
no. of abortion							0.000
0	130	62.2%	88	21.1%	6.1709	(4.2824-8.8923)	
1-2	58	27.8%	268	64.1%	0.215	(0.1496-0.309)	
> 3	21	10%	62	14.8%	0.6414	(0.3792-1.0848)	
Twin delivery							0.000
Yes	14	7%	12	2.9%	2.4291	(1.1027-5.3509)	
No	195	93%	406	97.1%			

Table 2 shows the association of preterm birth and the obstetric history in this study, the risk of induced preterm delivery significantly increased 2.68 times in >4 parity OR=2.68; 95% CI= (1.6201-4.4353) ;p<0.001. The cases significantly increased 4.4 times preterm delivery women with birth spacing less than 1 years. The highest percentage of history of abortion was (none aborted mother were 6.1 times in the case preterm delivery and control) OR=6.17; 95% CI= (4.2824-8.8923); p<0.001. Also shows that the percentage twin delivery were 7% in preterm cases and 2.9% in control study. The risk of preterm delivery increased 2.4 times in the women of twin delivery p<0.001.

Table (3) Distribution of sample according to disease during pregnancy

Variables	Cases (209)		Control (418)		OR	(95% C1)	p-value
Hypertension							0.000
Yes	122	58.4%	58	13.9%	8.7039	(5.8896-12.8629)	
No	87	41.6%	360	86.1%			
D.M							0.000
Yes	54	25.8%	30	7.2%	7.0389	(4.7789-11.7524)	
No	155	74.2%	388	92.8%			
UTI							0.000
Yes	77	36.8%	20	4.8%	11.6083	(6.8338-19.7185)	
No	132	63.2%	398	95.2%			

The risk of having hypertension in preterm cases about OR=8.7; 95% CI= (5.8896-12.8629). The highest percentage of D.M was among preterm cases than the control (25.8% and 7.2%) respectively. Significant association were found between preterm delivery and urinary tract infection OR=11.6; 95% CI=(6.8338-19.7185) shows in table 3.

Table (4) Distribution of sample according to antepartum hemorrhage

Table 7: Distribution of sample according to interpartum hemorrhage							
Variables	Cases (209)		Control (418)		OR	(95% C1)	p. value
Hemorrhage							0.705
Yes	60	28.7%	114	27.3%	1.0738	(0.7425- 1.553)	
No	149	71.3%	304	72.7%			

The minority of preterm delivery that have hemorrhage during pregnancy of preterm cases which is no significant $p > 0.001$ in table 4.

Table (5) Distribution of sample according to number visits of primary health care center during pregnancy.

Variables	Cases (209)		Control (418)		OR	(95% C1)	p. value
Visits no. of PHC							0.000
<1	50	18.2%	44	7.6%	2.5148	(1.6131-3.9294)	
2	81	23.9%	124	10.5%	1.5004	(1.0588-2.1261)	
3	57	38.8%	144	29.7%	0.7135	(0.4952-1.028)	
≥4	21	27.3%	106	34.4%	0.3288	(0.199-0.5431)	

Table 5 shows the association of number of visits (primary health center) during current pregnancy. Higher percentage of visits was among the cases of preterm with 3 visit (38.8%), while ≤4 visit (34.4%) in the control. the risk of having visits to primary health care center that are less than 1 visit about 2.51 times in the preterm cases .

Table (6) Distribution of sample according to body mass index after pregnancy

Variables	Cases (209)		Control (418)		OR(95% C1)	p. value
BMI						0.001
25-29.9	75	35.9%	211	50.5%	1.5491 (0.3902-0.7727)	
>30	134	64.1	207	49.5%		

Table 6 shows higher percentage of the preterm cases in obese (64.1%), while (50.5%) in control high significant (p- value <0.001).

Table (7) logistic regression of risk factors of preterm birth

Variables	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for EXP(B)	
							Lower	Upper
Abortion	-1.161-	.222	27.308	1	.000	.313	.203	.484
Parity	.472	.174	7.343	1	.007	1.603	1.140	2.256
Visit. no	-.401-	.136	8.649	1	.003	.669	.512	.875
B.S.I	-.677-	.111	37.383	1	.000	.508	.409	.631
Twin	-1.350-	.918	2.160	1	.142	.259	.043	1.569
U.T.I	-2.105-	.420	25.059	1	.000	.122	.053	.278
Hypertension	-1.884-	.292	41.600	1	.000	.152	.086	.269
D.M	-22.308-	4.590E3	.000	1	.996	.000	.000	.
Hemorrhage	.054	.298	.032	1	.858	1.055	.588	1.893

Table 7 shows that abortion ,parity, visit number, birth space interval ,urinary tract infection and hypertension are significant risk factors for preterm birth (p-value.000,.007,.003,.000,.000and. 000)

Discussion :

Preterm birth is the principal cause of infant mortality in developed countries. One in 8 births in the United States in 2005 was preterm, compared to 1 in 18 births in Ireland and Finland. The infant mortality rate in Ireland in 2010 was 3.89 per 1000 live births and in the United States 6.8 per 1000 live births. The main cause of the United States' high infant mortality rate when compared with Europe is the very high percentage of preterm births in the United States, the period when infant mortality is greatest [8].

The reported rate of preterm birth (31%) in western Iraq (Al-Anbar) is lower than that reported in eastern Iraq (Diyala) (51.8%) ⁴ and the center of Iraq (Baghdad) (50%) [9] in 2005 and 2006, respectively. However, the reported figure (31%) is almost double that reported in Baghdad in 1990s (15.1% and 13.3%) [10], which are in turn much higher than that reported in neighbor countries, Saudi Arabia (Riyadh) (7.1%, 7.4% and 8.2%) [11] and Syria (6.6%) [12] and Iran (5.2%) [13].

In this study, old age group showed increased risk (OR=5.019), it not agreement with a similar case control study from Lagos [14]. This finding has been attributed to the hormonal factors associated with advancing maternal age. However, there is insufficient evidence to determine if advancing maternal age is an independent and direct risk factor for preterm birth.

Recent studies have found no increase in the rate of preterm birth and employment, but these are mainly studies carried out in developed countries, where physical strain and hazardous working conditions are not the norm [15].Employment per se was not associated with preterm birth, with slightly increased risks in studies with more refined gestational age assessment and those with prenatal assessment [16, 17].

Although there are reports of mothers with no formal education being more likely to deliver preterm birth[18], a significant risk association was present study between PTB and illiteracy education , followed by secondary education , it agrees with similar study in Utah [19].

Increased parity is risk factor for preterm delivery. In this study we found significantly higher rates of preterm delivery associated with parity greater than 4. Other studies [20, 21] did not find a higher risk with increasing parity, but they examined a smaller number of deliveries or a lower maximum parity. On the other hand shows a systematic review revealed no association between grand multiparity (parity 5-8) and great grand multi parity (parity > 8) and preterm birth.

The role of parity may be context specific with effects of poverty combined with stress, and other factors associated with preterm birth [22,23and24].

Inter pregnancy intervals shorter than 18 months and longer than 59 months are significantly associated with increased risk of adverse preterm birth. These data suggest that spacing pregnancies appropriately could help prevent[25]. In the present study, the presence of significant association of non-abortion and preterm birth, disagreement all of the studies (France, Australia, and Denmark) found a statistically significant increased risk of preterm birth before 32 weeks for women under going at least one first trimester abortion [26, 27] Women under going two or more abortions had an even larger risk of preterm birth in Europe counters [28].

The study also investigated the possible association of PTB with medical diseases. Hypertension (OR = 8.7) is relatively common in Baghdad [4] and patients usually correctly recall its history and treatment. The association between PTB and D.M should be further investigated and documented by laboratory tests. Similar results found associated with PTB in Southern Spain [29]. Urinary tract infections were found to be a significant risk factor for PTB in this study, which reflects findings in some other studies in Syria and Iran [12,13]. In the present study, an OR of 1.07 for haemorrhage was found but was not significant the similar to the study in Vietnam[30]. A retrospective analysis into the timing of preterm birth and antepartum hemorrhage showed that the risk of preterm delivery, although higher with associated uterine contractions, was still significant even without contractions: 62.5% versus 13.6% [31]. The risk of having visits primary health center that are less than 1 visit about 2.51 times in the preterm cases which finding in other study [37]. The risk of preterm birth increase 2.4 fold among those who attended <4 visit than those who attended 4 visits during the entire pregnancy period [38]; it is worth that a WHO technical working group recommended 4 antenatal visits for a women with a normal pregnancy [39].

This study finding included a significant correlation between a maternal BMI of more than 29 and an increased risk for preterm delivery agreement with findings in Saudi Arabia [40].

Conclusion:

The highest rate of risk factors of preterm birth was among age group 40-49 years and illiterate educational level, there was higher risk of preterm birth among the study samples (parity>4, birth space interval<1years and twin delivery). Preterm birth was significant in women suffering from (hypertension, D.M and urinary tract infection) during pregnancy, significant association between visits of primary health care, BMI and preterm birth.

Recommendation:

Health education about family planning importance of adequate birth space interval, health education for mother, about important of regular visit to antenatal unit of primary health care center, especial care for pregnant women with chronic medical disease in tertiary hospital.

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