The Association between Maternal Factors and Preterm Birth and Premature Rapture of Membranes

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Abstract

Objective: The aim of this study was to estimate the frequency of preterm birth (PTB) and premature rapture of membranes (PROM) and their associations with maternal factors.

Material and methods: This cross sectional study was carried out at Akbar–Abadi hospital in Tehran during January 2009–Aprile 2010. Four hundred sixty six primiparous women with gestational age more than 20 weeks and singleton pregnancy were enrolled in the study. Data were analyzed using SPSS–16. P<0.05 was considered as being significant. maternal age, maternal height ,maternal education, pre–pregnancy maternal weight, occupation and smoking during pregnancy were compared between two groups (with or without PTB/PROM).

Results: This study shows the incidence of PTB to be 27.9% and PROM to be 34.7%. None of maternal factors in this study showed significant relation with PTB. Significant relation was found between maternal age and PROM, p<0.001. PROM was related to PTB significantly (p=0.040).

Conclusion: Findings highlighted the importance of maternal age as a cause of adverse pregnancy outcomes. Since this study showed PROM and PTB to be two common adverse pregnancy outcomes in Iran assembling appropriate services can lead mothers to improved pregnancy outcomes especially among older pregnant women.

Keywords: Premature rapture of membranes, Preterm labor, Preterm birth, Maternal factors

Introduction

Preterm birth (PTB) as a major determinant of neonatal mortality, morbidity and childhood disability, remains one of the most serious problems in obstetrics (1). Preterm or premature birth is defined as births that occur prior to 37 completed weeks' gestation (2), and it is accompanied in approximately two thirds of neonatal deaths (3).

Preterm birth ranges are form 6%–8% in Europe, Australia and Canada to 9%–12% in Asia, Africa and the United States (4).

A variety of short term morbidities such as hyaline membrane disease, patent ductus arteriosus, necrotizing intra colitis, intra ventricular hemorrhage and long term problems such as cerebral palsy, hydrocephalus, hearing loss, broncho pulmonary dysplasia (5) are lar-

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Table 1: Characteristics of pregnant women

	n (%)
Age (year)	
<18	115 (24.7%)
18–20	9 (3.2%)
20–30	306 (65.7%)
>30	30 (6.4)
Education (years)	
0–5	79 (17%)
6–12	354 (76%)
>12	31 (6.7%)
Occupation	
House wife	456 (97.9%)
Employed	10 (2.1%)
Smoking	
No	461 (98.9%)
Yes	5 (1.1%)
Pre–pregnancy BMI	
<25	286 (61.4%)
25–30	77 (16.5%)
>30	18 (3.9%)
Gestational age	
<37	134 (28.8%)
37–40	128 (27.5%)
>40	318 (70.3%)
PROM	
No	309 (66.3%)
Yes	157 (33.7%)
PTB	
No	331 (71%)
Yes	130 (27%)

gely due to organ system immaturity in infants born before 37weeks gestation compared with those delivered at term (1).

Premature rupture of the membranes (PROM) is another most common problems in obstetrics, complicating approximately 5–10% of term pregnancies and up to 30% of preterm deliveries (2). PROM is usually defined as rupture of the membranes before labor or any time before the onset of contractions (3, 2). The most serious outcomes of PROM are adverse maternal and infant outcome related to infection (6). There are a number of risk factors which have been associated with PTB or PROM including: cigarette smoking, low socioeconomic status, multiple gestation, maternal malnutrition, maternal age under 20 and up 35years and trauma (7).

A number of other medical conditions have also been associated with PTB including: Diabetes mellitus, Genital tract infections and PROM.

The aim of this study was to estimate frequency of

PTB and PROM and their associations with maternal factors in Tehran– Iran.

Materials and Methods

This is the first phase of a cross sectional study carried out at Akbar–Abadi university hospital in Tehran during January 2009 to April 2010. Four hundreds and sixty–six primiparous women with gestational age >20 weeks and singleton pregnancy were enrolled in the study. Preterm birth was defined as a birth with a gestational age less than 37 weeks and PROM was defined as a rupture of membranes before onset of uterine concentrations.

The study protocol was approved by the ethical committee of nursing and midwifery faculty of Iran University of Medical Sciences. All participating women were informed about the study and gave written consent. Non-Iranian women and patients with chronic medical diseases were excluded. Information on maternal age (years), maternal height (cm), maternal education (0–5, 6–12, >12 grades), pre–pregnancy maternal weight (kg), occupation (house wife, employed), smoking during pregnancy (yes / no) was collected. Some pregnancy outcomes including: gestational age (in weeks based on ultrasound and LMP) and time of membranes rupture were obtained from women's file. Besides maternal pre–pregnancy BMI was calculated using self–reported weight before pregnancy and height from the questionnaire.

Data were analyzed using SPSS–16 and two–dimensional tables with mean and standard deviation were used for describing demographic characteristics. For comparison of data between the two study groups, chi square test and fisher exact test were used. *P*-Value less than 0.05 was considered as being significant.

Results

A total of 466 primiparous women participated in the study. Of those 65.7% (306 cases) were between ages 20–30 years, 24.7% (115 cases) were under than 18 years, and 6.4 %(30 cases) were over 30 years of age. Further demographic information is listed on table 1.

The relationship between maternal factors and adverse pregnancy outcomes including PTB and PROM is summarized in Tables 2. Maternal age was considered as a significant variable associated to PROM (p= 0.040). The highest PROM rate belonged to the group of 26–30 years age (43.2%) and the lowest (23.3%) was in > 30 years group. We didn't find any relationship between maternal education, occupation, and BMI with PROM but there was a significant relation bet-

Table 2: Association between maternal factors and PROM and Preterm birth

	PROM		Preterm	
	Yes n (%)	**No** n (%)	**Yes** n (%)	**No** n (%)
Age (years)				
<20	7 (23.3)	85 (73.9)	32 (28.3)	81 (71.7)
21–25	73 (34.6)	138 (65.4)	54 (25.8)	155 (74.2)
26–30	41 (43.2)	54 (56.8)	29 (30.9)	65 (69.1)
>30	7 (23.3)	23 (76.7)	10 (33.3)	20 (66.7)
	P=0.040		P=0.731	
Education (years)				
0–5	24 (30.8)	54 (69.2)	24 (31.2)	53 (68.8)
6–12	118 (33.3)	236 (66.7)	94 (26.8)	257 (73.2)
>12	14 (43.8)	18 (56.3)	11 (35.5)	20 (64.5)
	P=0.413		P=0.473	
Gestational age (weeks)				
<37	65 (48.5)	69 (51.5)	—	—
37–40	86 (30.4)	197 (69.6)		
>40	6 (17.1)	29 (82.9)		
	P=0.001			
Pre pregnancy BMI (kg/m^2)				
<25	95 (33.2)	191 (66.8)	75 (26.5)	208 (73.5)
25–30	29 (37.7)	48 (62.3)	21 (27.6)	55 (72.4)
>30	3 (16.7)	15 (83.3)	5 (27.8)	13 (72.2)
	P=0.234		P=0.976	

ween PROM and gestational age (p<0.001). Maternal age, pre–pregnancy BMI, and education didn't show any significant relation with PTB (Table 2). Furthermore PROM is associated with PTB (P<0.001) significantly (Table 3).

Discussion

The maternal factors and socio–economic variables have been known to influence the reproductive outcomes and performance and the condition of the neonate at birth.

In our study, we examined the relation between some maternal factors such as age, educational level, and pre–pregnancy BMI with PTB and PROM. This study showed the incidence of PTB to be 27.9% whe-

reas Goldenberg et al have been reported the prevalence of preterm birth to be 12–13% in united states and 5–9% in developing countries (8). Yekta et al reported the prevalence of preterm birth to be 5.9% in Urmia–Iran (9) and Nili et al in their study in Tehran has reported 23.8 % (10). Although Nili study has done on teenage pregnancies and only 24.7% of our population was under 20 years, but maybe similarity in study population that is including Iranian women who are living in Tehran city makes their result near to ours. It seems the higher PTB prevalence in the Nili and our study is due to our study setting. Akbar–Abadi is a well known referral center for preterm labor cases in Tehran city because of its' well equipped NICU.

In this study despite the increasing incidence of

Table 3: Association between PROM and Preterm birth

		PTB n (%)	No PTB n (%)	Total n (%)
PROM	n (%)	58 (44.6)	97 (29.3)	155 (33.6)
No PROM	n (%)	72 (55.4)	234 (70.7)	306 (66.4)
Total	n (%)	130 (100.0)	331 (100.0)	461 (100.0)

* P<0.05

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preterm birth in 2 age spectrum of under 20 and over 30 years old but the relation between age and preterm labor wasn't significant. Whereas Dabbag and Taee found a significant risk association between preterm birth and women's age who were pregnant at younger ages (1). Nili et al and Markovitz et al found that pregnancy in early ages is the most important factor for preterm birth too (10, 11). They recommended this is because of social problems such as low education, lack of knowledge in relation to themselves, forced marriage and so on (10). Contrary to these studies, Andersson et al reported an increasing risk of preterm labor related to increasing age (12).

In this survey, we didn't found maternal education as a risk factor for preterm birth but many other studies such as Dabbag and Taee reported a positive significant association between maternal education level and occurrence of PTB. Other risk factors for PTB were social classes and employment status (1, 4, 13).

The majority of our subjects comprised housewives (98/1%), so we didn't able to test the relationship between occupation and PTB. Although Elsenbruch et al didn't find any significant association between these variables (14) but Dabbag and Taee found that limiting the amount of work done by pregnant women and avoiding fatigue, can help reduce the risk of PTB (1). Maybe these differences in our results with other studies are due to our sample size.

Other outcome evaluated in this study was PROM. The prevalence of PROM among pregnant women who referred to this hospital was 34.7%. Doody et al (1997) reported 38% of pregnancies confronted recurrent PROM (6). Although this frequency reported about recurrent PROM but it seems other related factors to PROM such as maternal age and BMI are the same in both of studies. In contrary to us, the prevalence of PROM is reported 3% by Kaur et al and up to 4% by Fergusen (7, 15). In the same way that it has been discussed, our research setting which is a referral center might cause the higher frequency of PROM too. In the other hand, we defined PROM in our study as rupture membranes before onset of labor without considering to the gestational age, but in other studies like Kaur et al and fergusen and et al studies, PROM was different with PPROM .PPROM defined as preterm premature rupture of membrane and PROM was premature rupture of membrane (7, 15).

We found a significant relation between age and occurrence of PROM. The most frequency of PROM (43.2%) occurred among 26–30 years mothers and the lowest (23.3%) was in more than 30 years (p=0.040).

Doody and et al found risk of PROM is higher among 25–35 years old mothers than other ages and after that, this risk decreased by 35 years and more (6). Ziadeh et al expressed that prevalence of abnormal labor and high risk pregnancy outcomes increased in older women (16). This is maybe due to higher rate of other maternal diseases accompany with pregnancy in older women (1).

We didn't find any significant relationship between education levels and PROM. In spite of our study, Fergusen et al have reported a significant association between educational level and socioeconomic status with PROM (7). This disaffiliation may be caused by small sample size.

We weren't able to find how, if any, relation is between occupation and PROM because most of our subjects were housewives.

This study presented PROM and PTB as two common adverse pregnancy outcomes which involve more than one forth of pregnancies in Iran. Although, our study didn't show any significant relationship between some maternal factors with PTB and PROM, but findings highlight the importance of maternal age as a potentially avoidable cause of adverse pregnancy outcomes. Therefore recognition of these mothers for assembling appropriate services, public supports and special care will lead to improved pregnancy outcomes in this population. Educating women for risks of pregnancy in both, early and late ages, can guarantee a safe pregnancy and healthy baby.

Acknowledgements

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