

SOCIODEMOGRAPHIC AND FOETAL CHARACTERISTICS OF MOTHERS WITH PREMATURE DELIVERIES IN HOSPITAL TUANKU JAAFAR SEREMBAN, NEGERI SEMBILAN, MALAYSIA

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ABSTRACT:

This is a retrospective case control study conducted between 1 January 2005 and 30 June 2006 at the Hospital Tuanku Jaafar, Seremban, Malaysia. The objective was to study the maternal sociodemographics and foetal characteristics associated with premature delivery. There were 387 cases selected universally and 387 controls selected by using systematic random sampling involving every 13 cases. The patients were women who had delivered their babies before 37 completed weeks, while the control were women who had term deliveries during the same period. Data were collected using structured questionnaire through secondary data. Results showed that having multiple pregnancies (OR=8.33, 95% CI: 2.91, 23.84), congenital abnormality (OR=4.6, 95% CI: 0.98, 21.84) and intrauterine growth retardation (OR=15.59, 95% CI: 3.69, 65.82) were the risk factors of premature delivery. Being an ethnic Indian also raised the odds (OR=1.67, 95% CI: 1.14, 2.43) but this was not significant in the multivariate analysis. Other sociodemographic characteristics did not contribute significantly to the risk factors for premature delivery in this sample. In conclusion, foetal characteristics were found to be significantly associated with premature delivery after adjustment for other confounding factors. (*JUMMEC 2008; 11 (2): 59-65*)

KEYWORDS: *Premature delivery, maternal sociodemographic and foetal characteristics*

Introduction

Premature delivery is a leading cause of perinatal mortality in the United States and all over the world. Infants born before 37 weeks of gestation are also at a higher risk of contracting infections and of having neuro-developmental problems (1). WHO defined premature delivery as infants born before 37 completed weeks as calculated from the first day of the last menstrual period. Premature delivery is a cause of 75% of perinatal morbidity and of mortality world wide (1). It is of public health importance as premature delivery contributes to 12.2% of perinatal mortality in Malaysia and 73.2% of perinatal mortality occurred in the first week of life (2). A study by Boo showed that 95.7% out of 329 premature babies had low birth weight, which was high risk for perinatal mortality (3)

Most causes of premature delivery are unknown. In Malaysia, the prevalence of premature delivery was 10% in the year 1998 (4). There were no published findings on maternal characteristics and foetal characteristics of premature deliveries. Therefore, it is important to look for the causes of premature delivery.

The objective of our study was to look at the maternal sociodemographic and foetal characteristics among mothers presented with premature delivery.

Methodology

The study was conducted in Hospital Tuanku Jaafar, Seremban, between 1 January 2005 and 30 June 2006. The study design was a retrospective case control study. Secondary data of the cases and controls were extracted from the medical records in the hospital. The patients were defined as women who delivered at less than 37 completed weeks while control was defined as women who delivered after 37 weeks period of gestation. Measurement of period of gestation was based on ultrasound and the last normal menstrual period.

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Table 1: Frequency Distribution of Maternal Sociodemographic Characteristics

Sociodemographic characteristic		Premature N=387 N (%)	Term N=387 N (%)	p value
Age (years)	Mean s.d	30.93 5.93	30.62 5.07	
Parity/ number of children	Median s.d	3 1.47	3 1.49	
BMIkg/m2	Mean s.d	25.12 3.7	24.65 3.83	
Ethnicity				0.00
Malay		259 (49.0)	270 (51.0)	
Chinese		32 (37.6)	53 (62.4)	
Indian		88 (61.5)	55 (38.5)	
Others		8 (47.1)	9 (52.9)	
Age group in years				0.45
<27		108 (49.1)	112 (50.9)	
28-31		107 (47.8)	117 (52.2)	
32-35		84 (48.8)	88 (51.2)	
>36		88 (55.7)	70 (44.3)	
Mothers' education				0.31
Primary		9 (69.2)	4 (30.8)	
Secondary		306 (50.3)	302 (49.7)	
Diploma/degree		72 (47.1)	81 (52.9)	
Marital status				0.56
Married		386 (50.1)	385 (49.9)	
Divorced		1 (33.3)	2 (66.7)	
Mothers' occupation				0.31
Professional & Management		34 (39.5)	52 (60.5)	
Skilled worker		15 (48.4)	16 (51.6)	
Semiskilled worker		80 (51.6)	75 (48.4)	
Unskilled worker		27 (56.3)	21 (43.8)w	
Businesswoman		17 (60.7)	11 (39.3)	
Housewife		214 (50.2)	212 (49.8)	

There were 12,015 deliveries during the study period. All mothers with premature delivery were selected as cases, while mothers with term delivery were selected as controls. The exclusion criteria were primigravida, cases referred from other states, non-Malaysians and mothers with intrauterine death.

A total of 774 respondents which consisted of 387 cases and 387 controls were selected into this study. The sample size was calculated by using EPI_INFO version 12 with $\alpha=0.05$, power=80%, and a prevalence of maternal smoking of 12% with OR=1.8 which was based on the study by Ahern *et al* (5).

A structured questionnaire was prepared to extract the data from the medical records. The questionnaire recorded sociodemographic characteristics of mothers such as age, ethnicity, education level, marital status, occupational status, smoking status, parity, and Body

Mass Index (BMI). Foetal characteristics such as sex, twin delivery, congenital abnormality and intrauterine growth retardation were also recorded using the same questionnaire.

Data Analysis

Data was entered and analysed in SPSS Windows version 11.5. Significant level was preset at 0.05 and 95% C.I. was reported where appropriate. Logistic regression was used to investigate the association of maternal sociodemographic and fetal characteristics on premature delivery. Variables with $p \leq 0.25$ were entered into the multivariate logistic regression model. The final model consisted of variables with $p < 0.05$.

Results

Table 1 shows the frequency distribution of sociodemographic characteristics of the mothers. The

Table 2: Association between Maternal Sociodemographic and Characteristics with Premature Delivery

Maternal Sociodemographic characteristic	Crude OR	95% CI	p value
Ethnicity			0.004
Malay	1.00	-	
Chinese	0.63	0.39,1.01	
Indian	1.67	1.14,2.43	
Others	0.93	0.34,2.43	
Age group in years			0.45
<27	1.00	-	
28-31	0.95	0.65,1.38	
32-35	0.99	0.66,1.48	
>36	1.30	0.86,1.97	
Education			0.31
Primary	2.51	0.75,8.57	
Secondary	1.14	0.80,1.63	
Diploma/ Degree	1.00	-	
Marital Status			0.56
Married	1.00	-	
Divorced	0.50	0.05,5.52	
Maternal Occupation			0.31
Professional & Management	1.00	-	
Skilled worker	1.43	0.63,3.28	
Semiskilled worker	1.63	0.96,2.78	
Unskilled worker	1.96	1.04,4.02	
Businesswoman/ self employed	2.36	0.98,5.66	
Housewives	1.52	0.96,2.47	

mean age of the mothers with premature delivery was 30.93 ± 5.93 years, while for the control was 30.62 ± 5.07 years. The average number of children for both groups was 3. There was a slight difference in terms of mean BMI for both groups. The mean BMI kg/m^2 was 25.12 ± 3.7 for the cases and 24.65 ± 3.83 for the controls.

Premature deliveries were significantly more common ($p=0.004$) among the Indian mothers (61.5%) as compared to Malays (49%), Chinese (37.60%) and others (47.10%). Mothers in the age group of more than 36 years old were more commonly found to have premature deliveries compared to mothers from other age groups.

About half of the mothers in the cases group received secondary level of education (50.3%), while about half of the control group received tertiary education (52.90%). Half of the mothers in the cases' group were married and about 60% of them were businesswoman/self-employed. A majority of the

Table 3: Association between Foetal characteristic with Premature Delivery

Foetal Characteristic	Crude ratio	95% CI	p value
Twin			<0.001
No	1.00	-	
Yes	8.33	2.91,23.84	
History of congenital abnormality			0.05
No	1.00	-	
Yes	4.60	0.98,21.84	
Baby sex			0.77
Male	1.00	-	
Female	1.04	0.78, 1.38	
History of intrauterine growth retardation			< 0.001
No	1.00	-	
Yes	15.59	3.69,65.82	

controls were professionals and/or worked in managerial positions. About two-thirds of the cases smoked compared to the controls.

The association between maternal sociodemographic characteristics with premature delivery for all cases and controls are presented in Table 2. The odds of premature delivery was 1.67 (95% CI 1.14, 2.43) times more likely in Indian mothers compared to Malay or Chinese mothers. However, variables such as age group ($p=0.45$), education status ($p=0.31$) and marital status ($p=0.56$) were not significantly associated with premature delivery. The association between maternal parity ($p=0.88$) and smoking status ($p=0.41$) with premature delivery were not significant. The association of BMI group was marginally significant ($p=0.06$).

Table 3 shows that history of twin delivery was a significant risk factor for premature delivery ($p<0.001$). The odds of premature births was 8.33 times higher in twin delivery compared to single pregnancy (95% CI 2.91, 23.84). Congenital abnormality was also marginally significantly associated with premature delivery ($p=0.05$). The odds of premature delivery was 4.6 times higher in congenital baby compared to a normal baby (95% CI 0.98, 21.35).

The association of foetal sex was not significant with premature delivery ($p=0.77$). The odds of premature delivery was 15.59 times higher in intrauterine growth

retardation baby compared to a normal weight baby (95% CI 3.69, 65.82).

Multivariate Analysis

In the final model of logistic regression (Table 4), history of twin pregnancy, congenital abnormality and intrauterine growth retardation were significantly associated with premature delivery. Mothers with twin delivery were 18.8 times more likely to have premature deliveries compared to controls (95% CI 6.30, 56.16). Mothers with congenital abnormalities were 6.70 times more likely to have premature delivery compared to controls (95% CI 1.28, 35.18), while mothers with intrauterine growth retardation babies were 25.46 times more likely to have premature delivery compared to controls (95% CI 5.55, 116.79).

Table 4: Final Predictors Model of Risk Factors For Premature Delivery

Predictors	Crude OR	95 % CI	Adjusted OR	95 % CI
History of twin pregnancy				
No	1.00	-	1.00	-
Yes	8.33	2.91, 23.84	18.80	6.30, 56.16
History of congenital abnormality				
No	1.00	-	1.00	-
Yes	4.60	0.98, 21.35	6.70	1.28, 35.18
History of intrauterine growth retardation				
No	1.00	-	1.00	-
Yes	15.59	3.69, 65.82	25.46	5.55, 116.79

Discussion

Maternal Socio-demographic characteristics

Maternal age was found to be a significant risk factor for premature delivery in many studies. Maternal age of less than 20 years and more than 35 years is a risk factor for premature delivery and perinatal mortality. However, this factor is not found to be a significant risk factor for premature delivery in this study. This could be due to the different age classification groups that might have contributed to non-significant findings. The exclusion of primigravida in the study might also have affected the results. Primigravida was excluded in this study because these mothers have no history of previous premature delivery and no history of

miscarriage as required in this study. Similar negative findings were found in other studies (6, 7, 8).

Many studies found that Black ethnicity with low social income received less medical care and had a higher risk of premature delivery compared to the White ethnicity (9, 10, 11, 12). In this study, being of Indian ethnicity was a significant risk factor for premature delivery in the univariate analysis with an odds ratio of 1.67 (95% CI 1.14, 2.43). However, it became insignificant in the multivariate analysis after adjustment for other risk factors. This could be due to the difference in inclusion and exclusion criteria where preterm birth was excluded in most of the studies indicated (7, 15, 16).

Occupation could be a risk factor for premature delivery. Strenuous activity, stressful work, physical fatigue, prolonged standing could lead to inadequate rest and subsequently maternal and foetal morbidity (17). A few studies have found that fatigue at work or stress could lead to premature delivery (14, 17). However, there were also contradicting findings in the relationship between occupation with the risk of premature delivery (9, 12, 16).

In the univariate analysis, there was a significant association between unskilled worker (OR=1.96, 95% CI: 1.04, 4.03) and businesswoman or self-employed women (OR=2.36, 95% CI: 0.98, 5.66) with the risk of premature delivery. However, it became insignificant after adjustments were made for other risk factors. This difference could be due to different inclusion and exclusion criteria, and different occupation classification groups. This finding is similar to those found in other studies (9, 12, 16).

Few studies have associated divorced or widowed mothers as a risk factor for premature delivery (8, 12, 16). However, the risk factor also depends on the mothers' income. Mothers with higher income will not be affected by broken marriages. In this study, marital status was not a significant risk factor for premature delivery (p=0.56). Other studies have also showed similar negative results (7, 17).

Maternal Characteristics

The association between parity with premature delivery is controversial. Some studies showed significant association between premature delivery with parity (13, 14, 18). However, some studies showed

contradicting findings between parity with premature delivery (16, 17). High parity was not a significant risk factor for premature delivery in this study with an odds ratio of 1.01 (95% CI 0.61, 1.68). The reasons for this finding could be due to differences in classification group, exclusion of primigravida, difference in inclusion and exclusion criteria where, in this study, indicated preterm birth was included besides difference in study population.

In one meta analysis on smoking mothers, the odds of premature delivery was 1.27 (95% CI 1.21, 1.33) with an evidence of a dose response relationship (12). However, smoking was not found to be a risk factor for premature delivery with an odds ratio of 1.50 (95% CI 0.25, 9.05) in this study. Similar findings were found in other studies (18, 19). The reason for our finding could be due to the small number of smoking mothers in our study.

Maternal nutritional status is associated with premature delivery. Some studies showed significant association between BMI and premature delivery (13, 14, 20). A study by Feresu *et al* (7) found that there was a significant association between mother's BMI (< 19.8 kg/m) with the risk of premature delivery with an odds of 1.82 (95% CI 1.11, 2.99). Obesity was also associated with premature delivery (14). In the Cardiff Birth Survey, it was found that women with weight of < 45 kg was associated with premature delivery with 2.27 times higher risk compared to women with normal weight (95% CI 1.23, 4.19) (13). Similarly, mothers with maternal weight of <50 kg had a higher risk of premature delivery (OR=2.72) compared to those with normal weight (9, 13).

However, Kramer *et al* (21) had contrasting findings. He found that there was a difference in determining the actual weight gain. Most of the studies take the average weight gain in a year instead of tissues weight gain. According to Kramer *et al*, the maternal weight gain was defined as tissues or cells weight gain instead of average weight gain. Besides that, some of his study subjects included mothers who had induced delivery.

However, our study did not find a significant association between maternal BMI > 30kg/m² with premature delivery ($p=0.06$) OR=1.10 (95% CI 0.47, 2.80) This

could be due to a difference in the classification group of maternal weights. Some studies used maternal weight of < 45 kg, (13) or weight of <50 kg (20) as the cut-off points for maternal nutritional status, while some studies used BMI < 18.5kg (7). There was also a difference in determining the actual weight gain. Most of the studies take the average weight gain in a year (7, 14). The maternal weight gain was defined as tissues or cells weight gain instead of average weight gain (5, 21). Besides that some studies included induced delivery and excluded congenital abnormality or twin pregnancy. In our study BMI > 30 kg/m² was used with reference to maternal BMI < 18.5 kg.

Foetal characteristics

Twin pregnancy, congenital abnormality and intra-uterine growth retardation are known as risk factors associated with premature delivery. Twin pregnancy is normally associated with premature delivery. It is due to the overstretching of the uterus which promotes preterm labour. Some studies showed association between twin pregnancy with premature deliver (14, 15). Twin pregnancy is a significant risk factor for premature delivery in this study with an adjusted odds ratio of 18.80 (95% CI 6.30, 56.16). However, others have shown negative finding (22). This could be due to the selection criteria where only mothers with previous twin pregnancy were included (22).

The foetus itself could be the cause of premature delivery. If the growth was retarded or malformed, the foetus was prone to be born prematurely (23). Some studies showed significant association between congenital abnormal babies and premature delivery (23, 24). Others noted that infants with congenital abnormality had a premature birth risk of 2.7 times higher than normal; and those with multiple congenital abnormality had a risk as high as 35 times more than normal babies (24).

In this study, foetal congenital abnormality was a significant risk factor for premature delivery. Mothers with history of foetal congenital abnormality were 6.70 times more likely to have premature delivery compared to mothers with no history (95% CI 1.28, 35.18). This finding is similar to other studies (15, 23).

Limitations Of The Study

Information gathered for the study was secondary data extracted from medical records. Not all variables could be found in the medical record files. Information on maternal income, fathers' smoking status, interpregnancy interval, history of drug abuse or alcohol, history of psychological problems such as depression, pre-pregnancy weight, history of occupational hazards was not available. Therefore, this study could not assess the mothers' characteristics as above. It is recommended that future study should be conducted in a prospective manner. In addition, the exclusion of primidgravida in this study could be another limitation.

Conclusions

Maternal sociodemographic characteristic was not a significant risk factor for premature delivery. Foetal characteristic was found to be significant in this study after adjusting for twin pregnancy, congenital abnormality and intrauterine growth retardation. It is recommended that antenatal mothers should have good antenatal and prenatal care for maternal medical problems since premature delivery could not be prevented.

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