Preterm birth and its associated risk factors. A study at tertiary care hospitals of Karachi, Pakistan

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Abstract

Objective: To study the factors associated with the risk of preterm birth among local population of Karachi, Pakistan.

Methods: This case control study was carried out on all those patients who were admitted in the post-partum wards of Civil Hospital and Abbasi Shaheed Hospital Karachi, during the period of January to May 2011. A total of 600 patients were part of this study. All those women who had preterm delivery (delivery at <37 weeks of gestation) were grouped together as case-group (n=300), while women who had term delivery (delivery ?37 and <42 weeks of gestation) were grouped as control-group (n=300). Data was collected by the help of a questionnaire which included questions related to the previous and current gestational history of the mothers, their nutritional status, drug addictions, urogenital, dental or systemic diseases they suffered, along with any physical or emotional stress they experienced during pregnancy. Last menstrual period and ultrasound reports were brought into use to calculate the precise gestational age of the baby. Data collected from the two groups were then compared to find out the possible risk factors of preterm delivery.

Results: A total of 600 subjects were divided into two equal groups of cases (n=300) and controls (n=300). There were 30 (10%) patients in the case-group and 33(11%) patients in the control-group who were above 35 years of age (p<0.05). At the time of delivery, 111(37%) cases and 51(17%) controls weighed <50kg (p <0.01). There were 264 (88%) cases and 117 (39%) controls with a haemoglobin level <10gm/dL (p <0.01). In the case-group, 15 (5%) patients had a history of previous multiple preterm deliveries, 24 (8%) had one previous preterm delivery, and 261 (87%) had no previous preterm delivery. In the control-group, no patient had a history of multiple preterm deliveries, 15(5%) had one previous preterm delivery, and 285 (95%) had no previous preterm deliveries (p <0.05). Common symptoms experienced in the gestational period in the case-group were dizziness/weakness (228; 76%), pain/malaise (213; 71%) and emotional stress such as anger (207; 69%). In the control-group the distribution was as follows: dizziness/weakness (168; 56%), emotional stress such as anger (165; 55%) and pain/malaise (141; 47%) (p <0.01). In the case-group, 69 (23%) women consumed fish, milk and pulses on a weekly basis, 177 (59%) on a monthly basis, and 54 (18%) did not take them at all. In the control-group, 174 (58%) patients consumed fish, milk and pulses on weekly basis, 90 (30%) on a monthly basis, and 36 (12%) did not take them at all (p <0.01). About 66 (22%) patients from the case-group and 21 (7%) in the control-group had evidence of periodontal disease on physical examination (p <0.05).

Conclusion: Low maternal weight, multiple previous preterm deliveries, periodontal diseases, maternal anaemia, physical and emotional stress are among the factors associated with the risk of preterm birth among the local population delivering in tertiary care, governmental hospitals of Karachi, Pakistan.

Keywords: Preterm, Risk factors, Maternal nutrition, Assess, Karachi. (JPMA 63: 414; 2013)

Introduction

Birth of a baby less than 37 weeks of gestational age is known as preterm birth.[1] The reduction of preterm birth is a demanding proposal since the cause, in many situations, is hard to get hold of.

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Preterm babies have an increased risk of death in the first year of life (infant mortality), with most of the deaths occurring in the first month of life (neonatal mortality). The occurrence of complications, and mortality rate, were found to be higher in preterm infants as compared to those of full-term infants.[2] Factors like age > 35, urinary tract infection in pregnancy, abruptio-placentae, polyhydramnios, preterm rupture of membranes, intrauterine death,[3] four or more uterine contractions in an hour before 37 weeks gestation,[4] maternal smoking,[5] diabetes mellitus and hypertension among pregnant

Preterm birth and its associated risk factors. A study at tertiary care hospitals of Karachi, Pakistan

415

women are risk factors that lead to preterm delivery.[6]

Low pregravid body mass index (BMI) is associated with an increase in the prevalence of late preterm delivery and of spontaneous preterm labour, hence, maternal BMI was also found to be a cause which leads to preterm birth.[7] Some researches have indicated that infectious agents play a role in either initiating preterm labour, causing premature rupture of the membranes, or preventing tocolysis. A significant cause of premature rupture of membranes is infection with Bacteroides species.[8] It was also found that mothers who did not consume fish during their pregnancy are at a strong risk of having preterm delivery and giving birth to low birth weight child. Small amounts of n-3 fatty acids   provided as fish or fish oil may confer protection against preterm delivery and low birth weight in women with zero or low intake of fish.[9]

Pregnant women of Pakistan have high levels of varying dental disease. The rates of stillbirth neonatal and perinatal deaths have increased in proportion to an increase in the severity of periodontal disease.[10] Iron deficiency anaemia increased the risk of preterm delivery by two times.[11,12] Low-birth-weight and preterm babies can be a result of psychological consequences such as anxiety, stress and depression during pregnancy and the puerperium.[13,14] The aim of this research was to determine the possible risk factors which are a common cause of preterm deliveries in patients delivered at the two tertiary care hospitals of Karachi. These two hospitals represent the low socioeconomic population of the city.

Patients and Methods

This case-control study was carried out among all those patients who delivered term and pre-term babies in the Gynaecology and Obstetrics wards of Civil Hospital, and Abbasi Shaheed Hospital Karachi, during the time period of January to May 2011. Cases were the patients who delivered babies at less than 37 weeks of gestation (preterm), while control were the patients who had given birth to babies of gestational age $\geq$37 and <42 weeks (term infants). A total of 600 patients, who were willing to give verbal consent, became a part of this study. Equal number of patients (cases and controls) became part of the study (300 from each hospital, subdividing into 150 controls and 150 cases) from both hospitals. In order to find the precise gestational age of the baby, last menstrual period (LMP) along with early ultrasound reports (up to 20 weeks of gestation) were brought into use.

The information regarding the gestational history of the participants was collected through a pre-tested and approved questionnaire from the institutional review departments of Dow University of Health Sciences, and Karachi Medical and Dental College. The Performa was divided into two sections. Questions of the first section were aimed at assessing the socio-economic status of the patient, while the questions of the second section targeted the gestational history of the patient. The second section included queries about diseases like: hypertension, diabetes mellitus, urogenital tract infections, periodontal disease (an inflammation and infection that destroys the tissues that support the teeth, like the gums, the tooth sockets, and the periodontal ligaments), parity, any previous history of preterm delivery or multiple preterm birth (having more than one delivery at less than 37 weeks of gestation in the past), emotional and physical stress experienced during pregnancy for which Edinburgh post-natal depression scale was used which has already been used in other studies also,[15,16] nutritional status and any drug addiction patient had during the period of gestation. Apart from this, the information which was assessed through the record file of the patient included; weight of the mother at the time of delivery. All those patients who had weight <50 kg at the time of delivery were classed as having low maternal weight, assuming that their weight at the time of booking would have been 45 kg or less (in pregnancy, there is a weight gain of 1kg/month). Complete blood picture report was done, in order to determine that if the patient was anaemic or not. Anaemia is defined as haemoglobin concentration below a normal value based on the reference population, also dependent on age, gender, race, and altitude. Hence, all women having a Haemoglobin level less than 10g/dl were classed as having anaemia, since Pakistan is a low resource country, and the level of anaemia varies from country to country.

Obstetrical ultrasound, urine DR, screening for hepatitis B and C and fasting blood glucose levels were noted down from the laboratory reports already present in the patients file. Cases and controls were matched for parity and socio-economic status i.e.; for all cases, controls were selected of the same parity and socio-economic status.

Patients of all ethnic origin were enrolled; from the patients who could not understand Urdu, data was collected by the help of attendants who translated the questions into the patient's native language. The criteria for inclusion in this study was all live spontaneous preterm or term births without any congenital anomalies.

The information collected by the help of a questionnaire from the patients of case and control-groups was then assessed to find out the possible risk factors leading to preterm delivery.

Chi-square was calculated to find out the relation among

different variables using SPSS version 16 statistical software (SPSS Inc, Chicago, IL). Binary logistic was used to estimates the odds of pre-term birth with 95% C.I for maternal age, Hb-levels, maternal weight, parity and diet.

Results

A total of 600 subjects were divided into two equal groups of cases (n=300) and controls (n=300). Periodontal disease was evident in 66 (22%) cases and 21 (7%) controls (p <0.05). Other co-morbids recorded more frequently in the case-group as compared to the control-group were hypertension and emotional stress (Figure).

Among case-group patients, 228 (76%) felt dizziness, 213 (71%) felt malaise and 207 (69%) suffered from emotional stress during period of gestation, as compared to control-

group women of which 168 (56%), 141 (47%) and 165(55%) had dizziness, malaise and emotional stress during pregnancy respectively (p<0.01). In the case-group, 69 (23%) women consumed fish, milk and pulses on a weekly basis, 177 (59%) on a monthly basis, and 54 (18%) did not take them at all. In the control-group, 174 (58%) patients consumed fish, milk and pulses on weekly basis, 90 (30%) on a monthly basis, and 36 (12%) did not take them at all (p <0.01). Betel nut consumption was positive in 69 (23%) cases and 48 (16%) controls (p <0.05).

By applying binary logistic, it was observed that 32 (10.66 %) cases were 35 years and above as compared to 33 (11%) patients from control group (p<0.05, O.R= 0.40, C.I= 0.23 - 0.70). Similarly 234 (88%) cases had haemoglobin level less than 10mg/dl (O.R= 43.31, C.I= 26.86 - 69.83) as

Table-1: Odds of preterm birth and 95% C.I using binary logistic regression.

Case-group	Number of patients (n=300)	O.R	95% C.I (lower & upper limit)	P-value
Maternal Age: (years)				
< 27	242 (80.6%)	Reference	03 - .09	
27 – 34	26 (8.66%)	0.05	23 - .70	< 0.05
35 or above	32 (10.66%)	0.4		< 0.05
Hb- levels: (mg/dl)				
14-0ct	34 (11.33%)	Reference		
<10	234 (88%)	43.31	26.86 - 69.83	< 0.01
>14	2 (0.66%)	3.69	65 – 20.92	> 0.05
Maternal weight (kg):				
>50	188 (62.6%)	Reference		
<50	112 (37%)	2.9	1.99 – 4.26	< 0.01
Parity:				
One	221 (73.66%)	Reference		
More than one	79 (26.33%)	0.07	05 - .10	< 0.01
Consumption of milk, fish and pulses:				
Weekly	69 (23%)	Reference		
Monthly	177 (59%)	3.78	2.28 - 6.27	< 0.01
Not at all	54 (18%)	4.95	3.40 – 7.23	< 0.01

Table-2: Adjusted odds for haemoglobin W.R.T maternal age and diet pattern.

Case group	Number of patients (n=300)	O.R	C.I = 95%	P-value
Hb- levels: (mg/dl)				
14-0ct	34 (11.33%)	Reference		
<10	234 (88%)	28.8	16.40 – 50.75	< 0.01
>14	2 (0.66%)	1.13	18 – 7.01	> 0.05
Maternal Age: (years)				
< 27	242 (80.6%)	Reference		
27 - 34	26 (8.66%)	38	17 - .85	< 0.05
35 or above	32 (10.66%)	8	03 - .20	< 0.05
Consumption of milk, fish and pulses:				
Weekly	69 (23%)	Reference		
Monthly	177 (59%)	1.91	0.95 – 3.83	> 0.05
Not at all	54 (18%)	4.62	2.55 – 8.38	< 0.05

Preterm birth and its associated risk factors. A study at tertiary care hospitals of Karachi, Pakistan
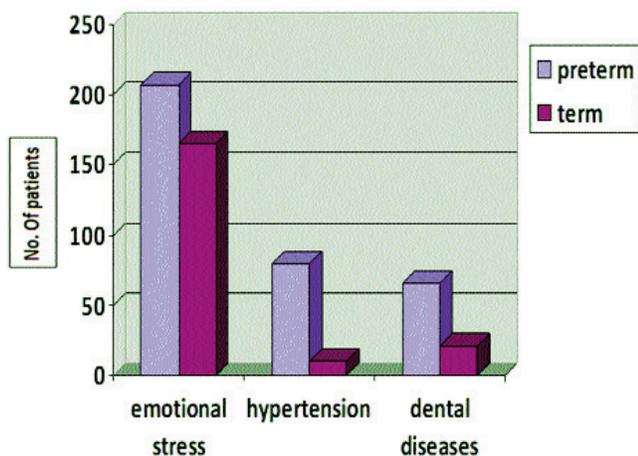
417

Figure: Frequency of dental diseases, hypertension and stress experienced by case and control group.

compared to 117 (39%) controls (p<0.01). Weight of the mother during the period of gestation was found to be one of the factors leading to preterm delivery, as 112 (37%) cases weighed less than 50 kg (O.R= 2.90, C.I= 1.99 - 4.26) as compared to 51 (17%) controls (p< 0.01) (Table 1 and 2).

Discussion

According to the study conducted, maternal weight at the time of delivery, periodontal diseases, low haemoglobin levels, previous history of preterm delivery, and poor maternal nutritional status during the period of gestation, were the potential risk factors of preterm birth among the women who delivered in the above two mentioned tertiary, governmental hospitals of Karachi, Pakistan.

From our study we concluded that, advance maternal age was not an important factor leading to preterm delivery, which was contrary to previous reports according to which women of older age were at greater risk of having preterm delivery.[17] However, weight of the mother at delivery was found to be associated with the risk of preterm birth. About 2.9 folds increase of having preterm delivery was found to be present among those women who had weight < 50kg before delivery. This is in accordance to similar studies which stressed on the fact that low maternal weight could increase risk of preterm and very preterm delivery.[18,19]

Dental diseases were also found to be an important risk factor of preterm birth, as has been reported by several other researchers.[20,21] In their study of finding relationship between pre-term delivery and periodontal disease, Bosnjak A. et al reported that dental diseases are a clinically significant risk factor for preterm birth.[22]

By the current study, maternal anaemia was also found to be a risk factor in promoting the event of preterm delivery, as supported by a similar study carried out by Allen LH.[23] An increased risk of around 43 folds, and when readjusted for maternal age and dietary habits, around 28 times the risk, was found to be present among those women who had a level of haemoglobin < 10 g/dl, of having preterm delivery.

Depression and anxiety were found to be two great risk factors resulting in preterm birth in accordance to previous studies.[24] Mulder EJ et al, in their study stated that, prenatal maternal stress was found to be related to the event of preterm labour,[25] similar finding was also discussed by Latendresse G., in his article.[26] Our study presented the same relationship between stress and chances of having preterm delivery.

Previous preterm deliveries were also found to play a role in the occurrence of preterm delivery among the local population here. This finding, that the prior history of preterm delivery potentiates the risk of having future preterm deliveries has been reported before.[27]

Maternal ill-nutritional status especially diet poor in fish, milk and pulses was also found to be one of the leading factors of preterm birth. Thus an increased risk of 4.95 fold was found to be present in spontaneous preterm delivery among those who did not consume diet containing fish, milk, and pulses. Similar findings have also been published by other researchers.[28]

Factors like maternal drug addiction (smoking, niswar, betel nut, caffeine) were found to be insignificant in this population.

This study was conducted at 2 government tertiary care hospitals in which women from different ethnic origins, pre-dominantly of low socio-economic class were admitted. A total of 600 patients' were enrolled. Low level of cooperation and linguistic problems were the only limitations faced during the study.

A preterm child has a greater rate of mortality and morbidity in the first year of life.[2] The numbers of preterm deliveries are increasing, and the possible reason could be that mothers are not aware of the risk factors that could lead to this condition.

Efforts should be made through public awareness programmes about the possible risk factors of preterm delivery. Not only this, further researches should be performed to find out other possible associations of genetic and other insults which a foetus suffers during the gestational period, that could lead to preterm delivery.

Conclusion

In the low income population of tertiary care government hospital of Karachi, low maternal weight, multiple previous pre-term deliveries, maternal anaemia, physical and emotional stress were associated with the risk of pre-term birth.

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