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Study of factors affecting and causing preterm birth

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Abstract

Preterm birth is a major cause of neonatal morbidity and mortality. More than 50% of preterm births are spontaneous. Objectives of this study were predicting risk factors of PTB, studying inter-relationship among factors affecting PTB and studying genetic influence for PTB occurrence. Descriptive study was conducted where questionnaires were filled self reportedly and by caretaking doctors. Mothers with familial vertical history were more likely to deliver PTB (62%). Maternal education was significantly negatively correlated with frequency of PTB ($r = -0.959$, $n = 111$, $p < 0.010$). Infections during pregnancy were one of the major causes of PTB (88%), BMI was an important determinant for PTB and interpregnancy interval less than one year had negative impact on PTB ($r = -0.988$, $n = 111$, $p < 0.010$). Mother using multivitamins and folic acid during pregnancy had fewer chances (29%) of delivering PTB. The study acknowledged some of the factors that demonstrate relationship with increased PTB frequency in mothers living in dissimilar socioeconomic conditions ($r = -0.928$, $n = 111$, $p < 0.010$). The present study serves as a primary data and will be helpful in future research on preterm birth in Balochistan.

Keywords: Preterm birth, preemie, primigravida, multigravida, socioeconomic status

1. Introduction

Preterm birth defined as live babies born before 37 gestational weeks are completed which normally lasts for about 40 weeks [1]. It is estimated that about 15 million babies are born PTB each year globally, which accounts for more than one in 10 babies [2]. More than 50% PTB are spontaneous and the rest are early initiation of labour for medical reasons and non-medical. Congenital deformities due to PTB cause 28% of all neonatal deaths. Prevalence rates of PTB are varying, on average ranging from 12% and 9% in low income and high income countries respectively [3]. Whereas Over 60% of PTB occurs in Africa and South Asia, some countries with high frequencies are Malawi (18.1%), Comoros (16.7%), Congo (16.5%), Zimbabwe (16.6%), Equatorial Guinea (16.5%), Mozambique (16.4%), Gabon (16.3%), Pakistan (15.8%), Indonesia (15.5%), and Mauritania (15.4%) [4].

Causes of PTB are not so clear yet. Many factors play significant role in increasing the risks of PTB which include preterm premature rupture of membranes, multiple pregnancies, infections during pregnancy, appendicitis, interpregnancy interval, conceiving baby through IVF, drug abuse, stress conditions, sexual, physical or emotional violence, maternal weight, uterus incompetency, cervical insufficiency, placental abnormalities and trauma or physical injury [4-5]. Chronic conditions such as diabetes, hypertension or high blood pressure, anaemia, genetic predisposition and gynaecological and familial history effects preterm birth [4].

Socioeconomic level, maternal nutritional status, maternal educational level and maternal occupation also contribute positively in preterm birth [5]. Maternal exposure to pesticides (mothers who work in fields are exposed to pesticides fumes) in one of the causes of PTB [6].

All babies who suffer from PTB may not experience the complications but few may suffer from long term and short term health complications. Some complications may arise in later weeks or months and certain may be apparent at birth [1, 6].

Preterm labour may not be completely prevented but a mother can indorse a better healthy pregnancy. Some preventive actions should be taken to reduce the risks of adverse pregnancy outcomes. The preventive measure include prenatal care, healthy diet, zinc supplementation, weight gain during pregnancy is recommended about 11 Kg to 16 Kg who have normal weight according to body mass index table (BMI) and if mother is overweight she might not or should lose weight [4, 7].

Treatment of preterm birth or labour is only possible to slow down the myometrial contractions (Tocolysis). Ritodine is only effective to control the myometrial contractions for 24 to 48 hours. Other treatments include, progesterone, relaxation of smooth muscles, conservation of cervical integrity which reduces the formation of gap junction, cervical cerclage, and multivitamins [4, 8]. The present study was conducted with the aim to study the risk factors affecting preterm birth in primigravida and multigravida pregnancies.

2. Material and Methods

A descriptive research study was conducted to determine the risk factors of the preterm birth in primigravida and multigravida pregnancies. One hundred and eleven patients were selected from six different tertiary care hospitals in Baluchistan, including both government and non-government hospitals from June 2016 to September 2016 in four month time period. The permission was granted by four hospitals (Civil Hospital Quetta, Bolan Medical Complex Quetta, Civil Hospital Dera Murad Jamali and General Hospital Quetta) whereas two hospitals refused the application due to certain security and other reasons. Following ethical rules and procedures, informed consent was obtained from each participant. The data was collected with the help of questionnaires and total of more than 50 questions were to be answered in every single questionnaire. The mother and her preterm infant were taken as participants for the study and data was collected through convenience sampling. Mother and her new-born baby's ID number were reserved same, to avoid confusion later in the research and to create a link between them. The collected data was analysed in SPSS version 20.

3. Results and Discussion

Maternal BMI score had positive correlation with preterm birth. Increase in BMI score increased the chances of preterm birth. Overweight and obese mothers were at a higher risk of delivering preterm babies as compared to the underweight and normal mothers. World health organisation has classified BMI into four classes through calculating their BMI score [9]. Out of 111 study participants only 2 were normal, 40 were overweight and rest 69 which was 62% of total were obese. These outcomes could be due to the reason that overweight and obese woman are at higher risk of developing certain chronic conditions such as gestational diabetes, hypertension and preeclampsia during pregnancy consequently increasing the chances of early labour initiation [4].

Table 1: Descriptive analysis of study factors.

Causes	No. of Cases	Percentage
Malnutrition	100	90 %
Infections during Pregnancy	98	88 %
Interpregnancy interval < 1 year	79	71 %
No supplement usage during Pregnancy	79	71 %
Obesity	69	62 %
Familial vertical history	69	62 %
Violence during pregnancy	68	62 %
Low socio-economic status	66	60 %
Urinary Tract Infections	60	54 %
Maternal education (Primary Class)	55	50 %
Malaria	46	42 %
Bacterial Vaginitis	28	25 %

Mothers with familial vertical history of preterm birth had significant role in delivering premature babies. Genetic

predisposition of mother and infant plays a substantial role in controlling the placental and fetal membrane growth which contributes to the initiation of labour by controlling the contractions of myometrium [10]. Mothers who themselves were born preterm, were at a higher risk of delivering premature baby as malnourished female child will turn to a weak woman of childbearing age and to a pregnant woman who delivers premature babies. This lifecycle will last and will further elevate the risks of preterm birth [10]. According to the present study results 42 mothers were not reported with history of preterm birth previously which is 38% of the total, 69 participants which was 62% having previously history for preterm birth.

Infections during pregnancy played major role in preterm birth. Mothers suffering from infection during pregnancy were at higher risks of delivering preterm birth [4]. Thirteen 13 study participants which was 12% of 111 total subjects included in the present study were not infected by any of the particular infection which leads to the preterm labour. Remaining 98 making up 88% were suffering from different infections, which includes urinary tract infections with the most high frequency of 54% of total infected mothers accounting 53 participants. Malaria was a second common infection found among the study subjects with the frequency of 41 which was 42% of total, 38% participants were infected by bacterial vaginitis, other included kidney infection and pneumonia with frequency of 25% and 2% respectively. The reason could be due to certain infectious agents who have potential to penetrate through uterus and causes inflammations in uterus and placenta. In response to inflammation cytokines are released by the immune system; elevated levels of cytokines is responsible for preterm initiation of labour [2, 11].

Inter-pregnancy interval had strong negative correlation with preterm birth frequency, as the inter-pregnancy interval decreases, preterm birth frequency increases. Strong negative correlation ($r = -0.988$, $n = 111$, $p < 0.010$) was calculated between inter-pregnancy interval and preterm birth. Mothers with interpregnancy interval less than a year were at a higher frequency of preterm birth as compared to mothers with more or long interpregnancy interval. Seventy nine 79 study participants out of 111 making up 71% of the total delivering premature babies had interpregnancy interval of one or less than one year, 30 mothers found with the interpregnancy interval of two years which was 27% of the participants included in the study, only 2 mothers 2% of the total had interpregnancy interval of three years. The reason could be during short interpregnancy interval mothers cannot recuperate from the biological stresses imposed by the preceding pregnancy resulting in depletion of macronutrient supplementation in maternal body, anaemia and increasing the risks of certain other factors effecting pregnancy outcomes [4, 12].

Increase in maternal education level was associated with the decrease in delivering premature babies. They both were negatively correlated with each other. Strong negative correlation ($r = -0.959$, $n = 111$, $p < 0.010$) was observed between maternal education and preterm birth at 0.05 α level. Maternal education was distributed in different orders. 50% out of total educated mothers completed their studies till elementary school delivered PTB, and were more likely to deliver premies as compared to more educated mothers. 25% of total completed their studies till matriculation, 17% just completed their studies till intermediate, 7% participants completed their studies till Bachelor's and only one mother

was found with higher studies till Masters making up 1% of total.

High frequency of mal-nourished mothers delivered premature babies as compared to well-nourished mothers. 90% of total mothers were mal-nourished during pregnancy whereas only 10% of total were well-nourished. Mal-nourished or well-nourished women were classified according to predefined standards set by the World Health Organisation [13, 14]. The reason could be maternal nutritional status during pregnancy as it plays a significant role in worsening the delivery outcomes, determining the gestational length, baby birth weight, preterm birth and certain other worse conditions [14, 15]. During pregnancy maternal body needs more food, varying diet, and additional macronutrient supplementation to full fill the extra needs of the body in second and third trimester.

Mothers living in low socioeconomic conditions were more likely to deliver premature babies as compared to mothers living in better conditions [6]. Strong negative correlation was calculated ($r = -0.928$, $n = 111$, $p < 0.010$) between maternal socioeconomic conditions and preterm birth. 60% participants were living in a family whose income was less than 20 thousand per month had a higher frequency and risks of delivering premature babies. As the familial income increases the occurrence of preterm birth drops respectively i.e. Monthly income of 21 to 30 thousand rupees per month were 20% of total, 31 to 40 thousand rupees per month were 10% and only 1 mother was found with the familial income of more than 41 thousand per month. These statistics could be due to the reason that mothers in higher socioeconomic class were having healthy surroundings and had healthy diet to produce heavier babies whereas the mothers in deprived socioeconomic level i.e. unhygienic environment and improper diet were at higher risk of delivering premature baby [1, 6].

Violence during pregnancy significantly increased the risks of preterm labour. 38% of total participants did not report about violence during pregnancy, remaining 62% were found suffering from violence during pregnancy. Among participants being violated during pregnancy, 55% were emotionally violated, 45% participants were physically violated and % participants were sexually violated. Number of mothers being violated exceeded from total 68 because some mothers were suffering from different type of violence at the same time. The reason could be physiological distress, hormonal changes due to behaviour or living in stressful conditions, physical or sexual violence leads to preterm premature rupture of membranes (PPROM) [4, 11]. Deprived maternal macronutrient deposits during pregnancy had positive impact on preterm labour. Most of the participants were not using any of the supplements consequently leading to preterm birth. 71% of the total participants included in the study were not using any supplementations during pregnancy, remaining 29% of the totals were using multivitamins and folic acid supplementations at the same time specifically 27 mothers were using multivitamins and 15 mothers were using folic acid. Although macronutrient supplementation is required in a small quantity, it is very essential for growth, development and functioning of baby in womb and also very important for mother. During pregnancy mother body needs a slight extra quantity of multiple macronutrient supplements compared to pre-conception, in order to fulfil the requirements of developing baby and mother [4, 11].

Maternal prenatal care visit was positively associated with

preterm labour as number of care visits were increasing frequency of preterm birth was decreasing significantly [4]. Strong negative correlation ($r = -0.920$, $n = 111$, $p < 0.010$) was calculated between prenatal care visits and preterm birth. 36% of the total was those who didn't visit or just one time consulted doctor during pregnancy, 35% visited two times, 25% participants visited three times and had reduced frequency compared to mothers who visited once or twice during pregnancy. Only 4 mothers were found who visited four times during pregnancy they had much decreased frequency compared to mothers with less visits. The reason could be, due to lack of awareness among mothers. They do not know about the various factors affecting preterm birth, increasing the risks significantly and are not consulting any doctor during pregnancy leaving those conditions untreated which consequently leads to preterm labour [2, 4].

4. Conclusion

The present study concluded that mothers with familial vertical history of PTB were more likely to deliver PTB. Maternal education was strongly associated with frequency of PTB preemies delivered. Mothers living in low socioeconomic conditions were at high risk of delivering PTB as compared to mothers living in better socioeconomic conditions, Infections during pregnancy was one of the major causes of PTB. Violence whether physical, emotional or sexual during pregnancy increases the risks of PTB significantly. BMI was an important determinant for PTB, Interpregnancy interval less than one year had significant impact on PTB delivery rates. Mother using multivitamins and folic acid during pregnancy had less chances of delivering PTB and malnourished women compared to well-nourished were at high risk of delivering PTB. The present serves as a primary data and will be helpful in future research on preterm birth in Balochistan.

5. Acknowledgement

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