Prevalence and Risk Factors of Spontaneous Preterm Birth

EMAD FYALA, M.D.
The Department of Obstetrics & Gynaecology, College of Medicine, Mansoura University, Egypt

Abstract

Objectives: To investigate the prevalence and risk factors of spontaneous Preterm Birth (PTB) at Mansoura University Hospitals, Egypt.

Methods: A questionnaire based case control study included 651 cases delivered at 24-37 weeks and another group of full term deliveries as controls (n=686). During 9 months study period, among 10452 live births, 651 (6.2%) were registered as spontaneous preterm birth at mean (SD) of 31.6 (2.2) gestational weeks.

Results: After inclusion in the final analyses, women who had history of miscarriage, preterm birth, caesarean delivery, and short inter pregnancy interval or having both low and high Body Mass Indexes (BMI) were at higher risk for PTB. Also the risk is found higher in those with history of periodontal infection or dental manoeuvres, vaginal bleeding, genital or urinary tract infection in the index pregnancy.

Conclusion: Spontaneous preterm birth predominates in our setting with a tendency to recur. More research is needed targeting the high risk group for implementing proper clinical services and aiding in prevention of this problem.

Key Words: Preterm – Birth – Prevalence – Egypt.

Introduction

PREMATURITY, a birth occurring before 37 completed weeks of gestation comprises nearly 15 million babies each year with a survival chances varying dramatically around the world [1,2]. South Asia and sub-Saharan Africa account for almost two-thirds of the world’s preterm babies and over three-quarters of the world’s new-born deaths are due to preterm birth complications [2]. Moreover children who are born prematurely usually have higher rates of cerebral palsy, sensory deficits, learning disabilities and respiratory illnesses with enormous physical, psychological and economic costs later in life [3].

Despite some severe low-and middle-income countries have halved their preterm deaths within a decade but many countries have made minimal progress [2,4] making a wide survival gap for preterm babies in different countries with more neonatal deaths in African babies [8]. The percentage of under-five deaths from preterm birth complications is still high in Egypt and our country is ranked as 144 worst on the list of 162 countries with prematurity related deaths comprising about 28.5% of all under-5 deaths in Egypt [4,5].

Therefore, in this study, we aimed to investigate the prevalence, sociodemographic characteristics, and hidden reproductive, medical and obstetrical risk factors of spontaneous preterm birth among all live births in one of the big tertiary care centres in Egypt.

Material and Methods

Our study was carried out at Mansoura University Hospitals as a prospective case control one during the period from January to September 2015. The hospitals are tertiary referral centre in the middle of Delta Egypt that give care for women coming to receive antenatal care and for referrals from the other private or general clinics as high risk pregnancies with more than 10,000 deliveries per year. The study was approved by departmental and local Institutional Research Ethical Committee, therefore performed in accordance with the ethical standards laid down in the Helsinki Declaration of 1975 as revised in 1983 and its later amendments.

Here; all delivered women with singleton babies were approached to participate in the study whenever those with intrauterine foetal death, major congenital foetal malformation, multiple pregnancy due to their known tendency to influence the risk of preterm birth. Also all cases of induced preterm
birth were excluded we gathered data for analysis from women who delivered a live born singleton infant after 24 weeks of pregnancy and before 37 completed weeks, these used as cases and comprised 651 patients. Another group of women who delivered a live born singleton baby at term (from 37-42 weeks) was selected as controls (these comprised 686 patients). A written informed consent was taken from every patient after receiving detailed written and verbal information about the study. Participation is voluntary and can be withdrawn by the patient at any time with no disadvantages. For all; a standardized questionnaires was used for data collection including the following domains;

1- Basic social and demographic data including, the age, gravidity, parity, residence, occupation, and Body Mass Index (BMI) as calculated by weight (kg) divided by height (m²). Haemoglobin (Hb) level on admission was recorded for everyone, the date of the last normal menstrual period was used to determine the gestational age, whilst with discrepancy between gestational age determined in this way and that calculated from ultrasound scanning greater than 2 week, the ultrasound estimate was preferred. The Inter-Pregnancy Interval (IPI), defined as the time lag between the woman's previous delivery or miscarriage and the first day of the last normal menstrual period for the index pregnancy, was also involved. Short IPI defined as less than 18 months duration was set significant risk factor for preterm birth [6].

2- Prior history of miscarriage, preterm birth, caesarean delivery, or any obstetric complication.

3- History of treating some obstetrics and medical disorders during the current pregnancy might be implicated as risk factors of preterm birth, mainly vaginal bleeding in early or late pregnancy, any dental procedure like tooth filling or extraction, history of periodontal infections, history of urinary tract or genital tract infection.

Statistical analysis:

All data collected were statistically analysed by using SPSS for windows version 17.0 (SPSS, Chicago, IL). Continuous data were expressed as mean ± Standard Deviation (SD) and proportions for the socio-demographic characteristics and then compared between both groups using student t-test and χ² respectively. Multivariate analyses were performed where preterm birth was the dependent variable and socio-demographic characteristics, medical and obstetrics events were independent variables. p-value <0.05 was set as statistically significant.

Results

Socio-demographic characteristics for both studied groups are shown in (Table 1). No significant differences recorded as regard patients’ age, gravidity, parity, residence, occupations (p-values are >0.05). Also mean Hb levels ±SD in both groups were found similar, 10.0±1.1 in cases versus 10.1±1.4 in controls (p-value 0.8). On the other hand, there are significant differences among cases and controls in the pattern of antenatal care and BMI (kg/m²) ±SD (p-values are 0.01, 0.003). Also a significant difference was reported as regard the mean gestational age/week ±SD in both groups (30.5±5.3 in cases versus 39.5±2.1 in controls, with p-value <0.001).

Table 1: Patients' demographic data compared to the control group. Data are presented as mean±SD and number (percentage), p-value was set significant when <0.05.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cases (n=651)</th>
<th>Control (n=686)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age/years ±(SD)</td>
<td>27.2 (5.3)</td>
<td>28.4 (5.6)</td>
<td>0.2</td>
</tr>
<tr>
<td>Gravidity ±(SD)</td>
<td>3.1 (2.1)</td>
<td>3.2 (2.1)</td>
<td>0.8</td>
</tr>
<tr>
<td>Parity ±(SD)</td>
<td>2.1 (2.1)</td>
<td>2.1 (2.3)</td>
<td>0.7</td>
</tr>
<tr>
<td>Residence:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>407 (62.5%)</td>
<td>406 (62.8%)</td>
<td>0.8</td>
</tr>
<tr>
<td>Urban</td>
<td>244 (37.5%)</td>
<td>240 (37.2%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Occupation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House wives</td>
<td>428 (65.7%)</td>
<td>414 (64.1%)</td>
<td>0.4</td>
</tr>
<tr>
<td>Employers</td>
<td>223 (34.3%)</td>
<td>232 (35.9%)</td>
<td>0.5</td>
</tr>
<tr>
<td>Irregular or no ANC</td>
<td>470 (72.2%)</td>
<td>190 (29.4%)</td>
<td>0.01</td>
</tr>
<tr>
<td>BMI (kg/m²) ±(SD)</td>
<td>26.8 (5.3)</td>
<td>23.3 (2.2)</td>
<td>0.003</td>
</tr>
<tr>
<td>Gestational age/week ±(SD)</td>
<td>30.5 (5.3)</td>
<td>39.5 (2.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hb level (g/dl) ±(SD)</td>
<td>10.0 (1.1)</td>
<td>10.1 (1.4)</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Abbreviations:

ANC : Antenatal Care.
BMI : Body Mass Index.
Hb : Haemoglobin Level.

As regard events in obstetric history and in the index pregnancy that may influence incidence of preterm birth are shown in (Table 2). There are obvious reported significant differences among cases and controls on comparing IPI/month ±SD, history of miscarriage, preterm birth or caesarean section (p-values are 0.02, <0.001, <0.001, <0.001 respectively). Also on comparing data from the index pregnancy as regard history of vaginal bleeding in early or late pregnancy, periodontal infection or dental manoeuvre, genital tract or urinary tract infections, cases showed significant differences than control group (p-values are 0.001, 0.001, 0.001, 0.003, 0.03 respectively).
Table (2): Shows past obstetric history and events in the current pregnancy implicated to be risk factors of preterm birth. Data are presented as mean ± SD and number (percentage). p-value was set significant when <0.05.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cases (n=651)</th>
<th>Control (n=686)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Past obstetric history of:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscarriage</td>
<td>131 (20.1%)</td>
<td>56 (8.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Preterm birth</td>
<td>96 (14.7%)</td>
<td>17 (2.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>105 (16.1%)</td>
<td>25 (3.9%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>IPI/month ± (SD)</td>
<td>22.3 (11.6)</td>
<td>26.4 (13.4)</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>History in the current pregnancy of:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal bleeding in early pregnancy.</td>
<td>151 (23.2%)</td>
<td>65 (10.1%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Vaginal bleeding in late pregnancy.</td>
<td>132 (20.3%)</td>
<td>27 (4.2%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Periodontal infection or dental manoeuvre.</td>
<td>148 (22.8%)</td>
<td>28 (4.3%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Genital tract infection.</td>
<td>132 (20.3%)</td>
<td>41 (6.3%)</td>
<td>0.003</td>
</tr>
<tr>
<td>Urinary tract infection.</td>
<td>82 (12.6%)</td>
<td>38 (5.9%)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Abbreviations:
IPI: Inter-Pregnancy Interval.

In (Table 3); suspected risk factors for preterm birth were analysed using multivariate analyses and showed that women who had history of miscarriage, preterm birth, caesarean delivery, short IPI, low BMI (<25) and high BMI (>30) were at higher risk for preterm birth in comparison to the control group. Also those with history of periodontal infection or dental manoeuvre, vaginal bleeding, genital or urinary tract infections during the current pregnancy were also more susceptible for preterm birth.

Table (3): Shows different causes and risk factors of preterm births with multivariate analyses. p-value was set significant when <0.05.

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of miscarriage.</td>
<td>2.1</td>
<td>1.0-4.5</td>
<td>0.03</td>
</tr>
<tr>
<td>History of preterm birth.</td>
<td>3.2</td>
<td>1.0-9.8</td>
<td>0.04</td>
</tr>
<tr>
<td>History of caesarean delivery.</td>
<td>5.4</td>
<td>1.7-17.3</td>
<td>0.004</td>
</tr>
<tr>
<td>Bleeding in early pregnancy.</td>
<td>3.3</td>
<td>1.4-16.1</td>
<td>0.01</td>
</tr>
<tr>
<td>Bleeding in late pregnancy.</td>
<td>5.0</td>
<td>1.3-18.1</td>
<td>0.01</td>
</tr>
<tr>
<td>History of genital infection.</td>
<td>3.0</td>
<td>1.2-15.1</td>
<td>0.01</td>
</tr>
<tr>
<td>History of urinary tract infection.</td>
<td>5.0</td>
<td>1.3-13.1</td>
<td>0.005</td>
</tr>
<tr>
<td>Periodontal infection or dental manoeuvre.</td>
<td>3.5</td>
<td>1.1-10.7</td>
<td>0.02</td>
</tr>
<tr>
<td>Short inter-pregnancy interval (&lt;18 months)</td>
<td>2.0</td>
<td>1.3-5.4</td>
<td>0.006</td>
</tr>
<tr>
<td>Low body mass index:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (&lt;25)</td>
<td>3.0</td>
<td>1.0-8.3</td>
<td>0.03</td>
</tr>
<tr>
<td>High (&gt;30)</td>
<td>3.1</td>
<td>1.0-9.0</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Discussion

Our study has documented that among 10452 live births during the study period, 651 were spontaneous single preterm births (6.2%). Those who had history of miscarriage, preterm birth, caesarean delivery, irregular or no ANC, dental manoeuvre or periodontal infection, early or late vaginal bleeding during pregnancy, short IPI, low/high BMI and those with treated genital tract or urinary tract infections during the current pregnancy were at higher risk for preterm birth. Some authors in our country demonstrated the rate of preterm birth to be slightly higher [7]. This may be attributed to the fact that our study included only spontaneous preterm births.

Compared to the rates of preterm birth in sub-Saharan and West African countries [8,9]; our results appeared lower, but still higher than that documented in Sudanese women by [10] who reported the incidence to be 3.8%.

Of all these preterm births, 324 occurred following spontaneous premature preterm rupture of membranes (49.8%) meanwhile the rest 327 (50.2%) occurred spontaneously with intact membranes. These data is slightly changed from those documented by some [11,12] who proved 45-50% of preterm births appear to be idiopathic meanwhile 30% are related to preterm rupture of membranes and the rest are induced for medical or obstetric cause. This difference in our results may be attributed to non-inclusion of the medically induced group.

The estimated gestational age of all preterm infants in our study ranged from 24-36 with the mean (SD) of 30.5 (5.3) weeks. Moderate/late preterm births, from 32 to less than 37 weeks, comprised the vast majority of cases (518=79.6%), very preterm births, from 28 to less than 32 weeks counted 82 cases (12.6%) while extremely preterm, less than 28 weeks, were only 51 (7.8%). These figures found slightly different than that internationally recorded by WHO [13] where more than 80% are born between 32 and 37 weeks of gestation, about 10% are born from 28 to <32 weeks and the rest below 28 weeks.

The short IPI appeared to be a well-known risk factor for preterm birth. This is proved by our results (OR 2.0, p-value 0.006) and come in accordance with data found by [6,7,10] who stated that inadequate birth spacing is associated with decreased gestational age and more liability for preterm births. Contrary to this a very recent published data concluded that live birth rates and adverse pregnancy outcomes including pregnancy loss were not associated with a very short IPI after a prior pregnancy loss [14].

The authors also observed that, preterm births have a tendency to recur in subsequent pregnancies.
This is not new as several studies demonstrated increased recurrence of preterm birth [7,10,15] and not only women with a first spontaneous preterm birth is likely to experience a spontaneous preterm birth but also more likely to deliver a medically indicated preterm birth in subsequent pregnancy [15].

In agreement with some previous reports [11,13] nutritional factors remain important determinants of preterm birth in our study as indicated by changes in BMI. Moreover, recent studies investigated the women pattern of nutrition and elements of food intake during pregnancy [16-18] and proved that those adherent to “traditional” diet pattern were at lower risk of preterm delivery compared to others who pass on diet high in meat and fats while low in fruits and vegetables. This delicate investigation of diet intake is deficient in our study as it depended mainly up on BMI changes.

The author also added by this study amore evidence supporting the association between previous caesarean delivery and preterm birth published before [19] and also between periodontal infection or dental manoeuvres during pregnancy and preterm birth [20].

Our patients with history of treated genital tract infection or urinary infection during pregnancy proved to have preterm birth more than controls. The same results obtained by some other authors before who stated that even subclinical infection implicated in the aetiology of idiopathic preterm labour [21,22].

As a limitation of our study is its lack in investigating a history of substance abuse, alcohol or smoking as these are uncommon among Egyptian women and difficult to be investigated despite its obvious effects in causing preterm births [23,24]. The maternal carriage of FV Leiden mutation is well known to be associated with increased risk of preterm birth [25,26]. This is also again a potential limitation of our study as it is deficient in investigating this point. Some other potential limitations in our study that warrant consideration; despite our hospital is a large sized hospital, the reported rate of preterm birth is thought by the authors to be less than real and might not reflect the actual in the community. This perhaps may be due to, many difficult reaching of many cases from district areas or hospitals and exclusion of twin deliveries, stillbirths, induced preterm births understimates the cases.

Conclusion:
Spontaneous preterm birth predominates in our settings and has tendency to recur. More investigations are needed in the area of infections, nutrition, and FV Leiden mutation for implementing proper clinical services and to aid in prevention of such problem in our society.

Declaration of interest:
The authors declare that they have no conflict of interest. The authors alone are responsible for the content and writing of this article.

References
10- ALHAJ, AMEL M., RADJ, ELGONI A. and ADAM, ISHAG.: Epidemiology of preterm birth in Omdurman


