World Journal of Medical Sciences 12 (1): 09-16, 2015
ISSN 1817-3055

DOI: 10.5829/idosi.wjms.2015.12.1.9243

Rate and Risk Factors of Preterm Births in a Secondary Health Care Facility in Cairo

[1]Ayman S. Abdelhady and [2]Alaa Abdelwahid

[1]Public Health Department, Faculty of Medicine, Al-Azhar University, Cairo, Egypt
[2]Occupational Health and Industrial Medicine Department,
Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Abstract: Preterm birth (PTB), defined as childbirth occurring at less than 37 completed weeks, is the chief problem in obstetrics today and approximately 10 percent of all births are preterm. It is considered a major determinant of neonatal mortality and morbidity and has long-term adverse consequences for health. The study was conducted to detect the rate and factors affecting PTBs among all deliveries encountered in a secondary health care facility (El-Moneera general hospital in south Cairo) during the period from July to December 2014. Mothers were investigated using pre-coded questionnaire containing the relevant variables (socio-demographic data with menstrual & obstetric history). Babies were also examined for their parameters just after their delivery as well as their characteristics. Results detected that only (41deliveries=8.2%) were PTBs among all deliveries encountered in the place of study with mean weight (2087±176g) compared with (3132±435 g) of term births. The most significant risk factors associated with PTBs were low maternal weight(<50kg),where recorded by (39%) vs (21.7%) of full term mothers, ante-partum maternal morbidities especially anemia, hemorrhage and infection where reported by (58.5%),(29.3%) &(22%) respectively of preterm births vs (37.7%),(11.5%) & (10.9%) respectively. Medication use during pregnancy especially steroids was associated with development of PTBs where recorded by (24.4%) vs (11.1%) while regular attending antenatal care was higher among full term mothers as (66%) vs (34.1%) of PTBs mothers. Other obstetric factors related to PTBs included primiparity & past history of abortion and PTBs. Significant fetal factors included twins pregnancy & the presence of fetal & placental anomalies. The study recommended that risk factors that may be amenable to control should be determined through epidemiological researches. Targeting high risk groups through clinical services in addition to raising socioeconomic standards of mothers especially health status and education are approaches that may aid prevention of PTBs problem in our society.

Key words: Antenatal care · Preterm births · Neonatal mortality

INTRODUCTION

Preterm birth (PTB), defined as childbirth occurring at less than 37 completed weeks or 259 days of gestation, is a major determinant of neonatal mortality and morbidity and has long-term adverse consequences for health [1]. Preterm birth in the United States accounts for 35% of deaths in the first year of life. Children who are born prematurely have higher rates of cerebral palsy, sensory deficits, learning disabilities and respiratory illnesses compared with children born at term. The morbidity associated with preterm birth often extends to later life, resulting in enormous physical, psychological and economic costs [2]. Estimates indicate that in 2005 the costs to the United States of America alone in terms of medical and educational expenditure and lost productivity associated with preterm birth were more than US$ 26.2 billion [3].

Preterm birth rates have been reported to range from 5% to 7% of live births in some developed countries, but are estimated to be substantially higher in developing countries. These figures appear to be on the rise [4]. Events leading to preterm birth are still not completely understood, although the etiology is thought to be

Corresponding Author: Ayman S. Abdelhady, Public Health Department,
Faculty of Medicine, Al-Azhar University, Cairo, Egypt. E-mail: aymansahady @gmail.com.

multi-factorial. It is, however, unclear whether preterm birth results from the interaction of several pathways or the independent effect of each pathway. Causal factors linked to preterm birth include medical conditions of the mother or fetus, genetic influences, environmental exposure, infertility treatments, behavioral and socioeconomic factors and iatrogenic prematurity. Approximately 45–50% of preterm births are idiopathic, 30% are related to preterm rupture of membranes (PROM) and another 15–20% are attributed to medically indicated or elective preterm deliveries [5].

Preterm birth rates available from some developed countries, such as the United Kingdom, the United States and the Scandinavian countries, show a dramatic rise over the past 20 years. Factors possibly contributing to but not completely explaining this upward trend include increasing rates of multiple births, greater use of assisted reproduction techniques, increases in the proportion of births among women over 34 years of age and changes in clinical practices, such as greater use of elective Caesarean section. For example, the increasing use of ultrasonography rather than the date of the last menstrual period to estimate gestational age may have resulted in larger numbers of births being classified as preterm [6, 7].

It was estimated that 9.6% of all births were preterm in 2005, which translates to about 12.9 million births definable as preterm. Approximately 85% of this burden was concentrated in Africa and Asia, where 10.9 million births were preterm. About 0.5 million preterm births occurred in Europe and the same number in North America, while 0.9 million occurred in Latin America and the Caribbean [8].

In developing countries, accurate and complete population data and medical records usually do not exist. Furthermore, estimates of the rate of preterm birth in developing countries are influenced by a range of factors including varying procedures used to determine gestational age [9, 10].

Unfortunately, there are currently no effective diagnostic measures for preterm labor resulting in preterm birth and no effective early interventions for prevention but some preventive measures play an important role, where raising socioeconomic standards with proper medical care of pregnant women including proper nutrition, health education are of utmost importance [11].

This work aims to reveal the rate and determinants of preterm births in a secondary health care facility in south Cairo, in order to promote the health of mothers and babies & attain finally a favorable outcome of the pregnancy.

MATERIALS AND METHODS

A center-based cross sectional study was conducted to detect the Percentage and factors affecting preterm births (PTBs) in an area in south Cairo, through a secondary health care facility (Al-Moneera general hospital, MOH),where all women attending the delivery room of the obstetric unit of the hospital were investigated for their delivered babies during the period between July to December 2014.

Three well trained nurses working in the delivery room throughout the day, beside an obstetrician specialist were asked to share in the study.

So, for every delivery in the study, a medical examination was carried out in the form of a questionnaire for the mother which included:

* Relevant maternal socio-demographic data: age, education level and occupation besides maternal characteristics as weight, morbidity during pregnancy (Infection, hemorrhage, anemia and hypertension), regular attending antenatal care and using medications during pregnancy other than tonics if any.
* Menstrual &obstetric history of the mother (L.M.P & parity, spacing, past history of preterm labor and abortion).
* Clinical examination of the baby included: neonatal parameters(weight, height and head circumference), gestational age, fetal sex, type of pregnancy(single or multiple), any fetal abnormality, placental condition as regards its shape and position.

Authoritative permission was obtained before beginning of the study.

Data were collected and analyzed for interpretataion where:

* Tests used in statistical analysis were: independent samples t- test, F-test & x^2 test.
* Accepted level of significance was $P< 0.05$ or less.

RESULTS

The study revealed that (41 deliveries =8.2%) were preterm deliveries among all deliveries in the obstetric unit of El Moneera general hospital during the period from July to December 2014.

Table (1): showed the relation between gestational age and some relevant socio-demographic data of the studied mothers, where it was found that more mothers of

Table 1: Maternal socio-demographic data and characteristics vs gestational age.

	Gestational age						
	Preterm (n= 41)		Full-term (N=470)		Total (N= 511)		
Maternal characteristics	No.	%	No.	%	No.	%	Significance test
Age (years)							
<19	17	41.5	119	25.3	136	26.6	X^2=5.1
19-	16	39.0	218	46.4	234	45.8	P=0.07
35+	8	19.5	133	28.3	141	27.6	
Education							
Illiterate	13	31.7	170	36.2	183	35.8	X^2=1.9
Intermediate*	24	58.5	226	48.1	250	48.9	P=0.4
High	4	9.8	74	15.7	78	15.3	
Occupation							
Housewife	9	22.0	74	15.7	83	16.2	X^2=1.1
Partially working	19	46.3	227	48.3	246	48.1	P=0.6
Fully working	13	31.7	169	36.0	182	35.0	
Weight(kg)							
<50	16	39.0	102	21.7	118	23.1	X^2=6.4
50+	25	61.0	368	78.3	393	76.9	P=0.012
Morbidity (+ve) anemia	24	58.5	177	37.7	201	39.3	X^2=6.8 P=0.009
Hypertension	18	43.9	86	18.3	104	20.4	X^2=15.3 P=o.ooo
Hemorrhage	12	29.3	54	11.5	66	12.9	X^2=10.5 P=o.ooo
Infections**	9	22.0	51	10.9	60	11.7	X^2=4.9 P=0.035
Regular attending antenatal care (+ve)	14	34.1	310	66.0	324	63.4	X^2=16.4 P=0.000
Medication use*** during pregnancy (+ve)	10	24.4	52	11.1	62	12.1	X^2=6.2 P=0.012

Intermediate education *:from (read &write) level to secondary level.

Infections* *: include bacterial vaginosis, Chlamydia trachomatis, Candida and genito-urinary tract infection.

Medications***: include antibiotics, steroids, cough sedatives and traditional medications.

Table 2: Fetal characteristics vs gestational age

	Gestational age						
	Preterm (n= 41)		Full-term (n=470)		Total (n= 511)		
Fetal characteristics	No.	%	No.	%	No.	%	Statistical test
Sex							
Male	23	56.1	257	54.7	280	54.8	X^2=0.03
Female	18	43.9	213	45.3	231	45.2	P=0.8
Abnormal placenta (+ve)	13	31.7	66	14.0	79	15.5	X^2=9.0 P=0.003
Pregnancy type							
Single	32	78.0	424	90.2	456	89.2	X^2=5.8
Multiple	9	22.0	46	9.8	55	10.8	P=0.016
Fetal anomalies (+ve)	5	12.2	20	4.3	25	4.9	X^2=5.1 P=0.02

preterm labor had weight (less than 50 kg) than those of full-term labor as (39%) vs (21.7%) respectively. Affection with anemia, HTN, Hage and infection was higher among preterm labor mothers as (58.5%, 43.9%, 29.3% & 22% respectively) vs (37.7%, 18.3%, 11.5% & 10.9% respectively) of full-term mothers. Regular attending antenatal care was recorded by (66%) of full-term mothers vs (34.1%) of preterm labor mothers while using medication other than tonics during pregnancy was reported by (24.4%) of preterm labor mothers vs (11.1%) of full-term mothers. All the previous differences were statistically significant. Most of the preterm labor mothers (58.5%) had an intermediate level of education vs (48.1%) of full-term mothers, while housewives constituted (22%) of preterm mothers vs (15.7%) of full-term mothers. The greater proportion of preterm mothers (41.5%) was aged (less than 19 years) vs (25.3%) of full-term mothers with statistically insignificant differences.

Table (2): Compared preterm labor with full-term deliveries as regards outcome of the pregnancy, where it was found that a higher percentage of twins deliveries (22%) was detected among preterm labor than that of full-term deliveries as (9.8%). Also, fetal abnormalities as well as abnormal placenta were found to be higher among

Table 3: Fetal parameters vs gestational age

	Gestational age			
Fetal parameters	Preterm (n=41)	Full-term (n=470)	Total (n=511)	F-test
Weight (g)				
Mean±S.D.	2087±176	3132±435	3048±507.1	F=15.6 P=0.000
		t=16.2 P=O.OOO		
Length (cm)				
Mean±S.D.	44.0±2.1	47.2±3.3	46.9±3.3	F=25.2 P=0.000
		t=6.01 P=O.OOO		
Head circumference (cm)				
Mean±S.D.	29.5±1.5	29.8±1.7	29.9±1.7	F=1.1 P=0.29
		t=1.4 P=O.15		

Table 4: Obstetric history of the studied mothers vs gestational age

	Gestational age						
	Preterm (n=41)		Full-term (n=470)		Total (n=511)		
Obstetric history	No	%	No.	%	No.	%	Significant test
Parity							
First baby	14	34.1	88	18.7	102	20.0	X^2=5.6
Second+	27	65.9	382	81.3	409	80.0	P=0.018
Spacing (years)							
< 1.5	18	43.9	119	25.3	137	26.8	X^2=6.7
1.5-	15	36.6	218	41.4	233	45.6	P=0.03
3+	8	19.5	133	28.3	141	27.6	
(+ve) Past history of preterm labor	14	34.1	77	16.4	91	17.8	X^2=8.1 P=0.004
(+ve) Past history of abortion	17	41.5	82	17.4	99	19.4	X^2=13.9 P=0.000

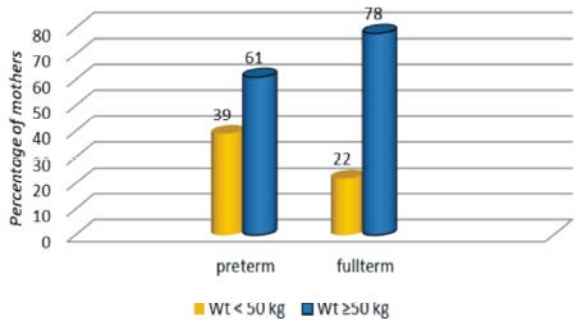

Fig. 1: Mothers weight vs gestational age

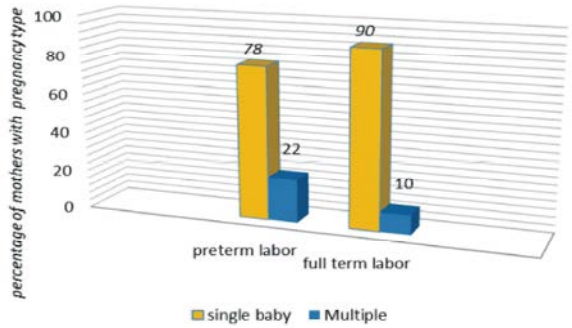

Fig. 2: Pregnancy type Vs gestational age

preterm deliveries as (12.2%)&(31.7%) respectively than full-term deliveries as (4.3%) &(14%) respectively with statistically significant differences. As regards sex, males constituted (56.1%) of preterm babies vs (54.7%) of full-term ones with statistically insignificant difference.

Table (3): Revealed that all neonatal parameters were higher among full-term babies rather than preterm ones where the mean weight & length were (3132 ±435 g & 47.2±3.3 cm respectively) for full-term babies VS (2087±176g & 44±2.1cm respectively) for preterm ones with statistically significant differences.

Table (4): showed that: preterm deliveries were likely to be the first baby rather than the second or more in (34.1%) compared to (18.7%) of full-term deliveries. Among preterm deliveries the percentage of mothers having no enough spacing between pregnancies was (43.9%) in contrast to (25.3%) of full-term ones. Past history of preterm labor and abortion were detected higher among preterm mothers as (34.1%) & (41.5%) respectively than full-term mothers as (16.4%) & (17.4%), with statistically significant differences.

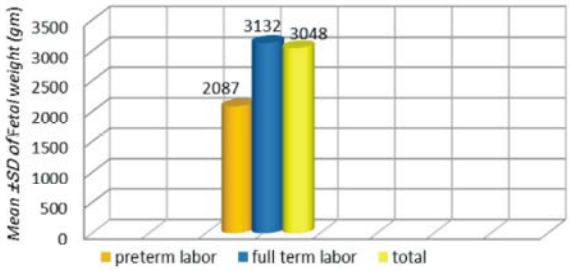

Fig. 3: Fetal weight vs gestational age

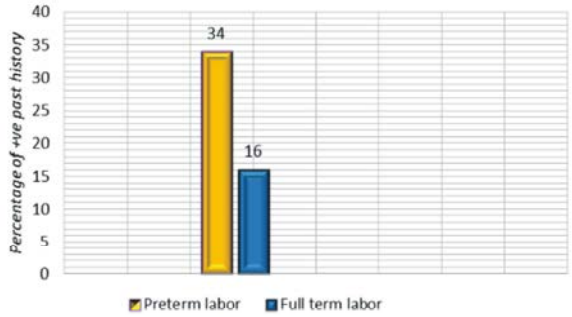

Fig. 4: Past history of preterm labor vs gestational age

DISCUSSION

The problem of preterm births (PTB) is a multidimensional public health concern affecting not only maternal & child health but also reflects on the society. Preterm delivery is the chief problem in obstetrics today, approximately 10 percent of all births are preterm [12]. The percentage of preterm deliveries in our study was (8.2%) of all deliveries in the place of study. This result was in agreement with other studies which stated that the rate of preterm deliveries is ranging between (7-10%) in almost countries [13].

Its prevalence is affected by the way in which gestational age is assessed as well as by national differences in the registration of births and associated practices. Despite these uncertainties, there is reliable evidence that preterm births are increasing globally [14].

Maternal socio-demographic data were found to be important risk factors of having preterm deliveries, where mothers of low weight (< 50 kg) were more likely to have PTB than others. Results obtained by Fahim *et al*. [15] in their study in Ain Shams university hospital showed that the lower the socioeconomic standard, the more the risk for preterm labor ($p < 0.05$) & body weight less than 70 kgm is associated with preterm labor ($p < 0.001$).Another study conducted in USA, by Emily [16] revealed that in nonblack adolescents, lower body mass index was associated with lower gestational age..

On the other hand maternal morbidity, especially anemia was associated with the development of PTBs because it interferes with intra-uterine fetal growth. The same result may be obtained if blood supply of the fetus was interfered with by any cause as hemorrhage or hypertension. Common reasons contributing to preterm births include anemia, pre-eclampsia or eclampsia and intrauterine growth restriction as stated by Fahim *et al*. [15].

In our study infection also played an important role in inducing PTBs especially genitourinary tract. There is wider acceptance of the importance of infection as a factor in preterm birth. Infections with viruses, protozoa, or bacteria are involved in preterm delivery [17]. The study conducted by El-Sokkary [18], revealed that there is an evidence that untreated bacteriuria in pregnancy may lead to less favorable pregnancy outcomes as well as complications like PTBs, low birth weight, pre-eclampsia and anemia of pregnancy where uterine contractions may be induced by cytokines and prostaglandins, which are released by microorganisms. He concluded that the prevalence of asymptomatic bacteriuria among pregnant women with preterm labor in a tertiary health center in Cairo, Egypt was high (23.5%).

In our study, a lower proportion of PTB mothers (34.1%) than full term ones (66%) were regularly attending antenatal care. In USA, a study conducted by Chen *et al*. [19] reported that teenage mothers are more likely to get inadequate prenatal care which has been strongly associated with preterm birth. Adolescents with good access to health care often do not show a higher risk of complications.

Our study revealed that using some medications other than tonics may be risky. That result was confirmed by Akila *et al*. [20], who stated that steroid therapy during pregnancy for asthma or collagen disease was a risk factor for PTB before 34 and 37 weeks. They concluded that association of premature labor with autoimmune function may be the consequence of abnormalities in normal fetal–placental tolerance, leading to uterine activation and labor.

Young aged mothers and those who had low education level were insignificantly at increased risk of having PTBs. In agreement with that result, a study was carried out using unifactorial analyses showed that lower social class, less education, low income and stressful lifestyle were all significantly associated with an increased risk of preterm birth [21].

In our study, part-time work constituted also insignificantly risk factor for PTBs before 37 weeks of gestation. in contrast to that result, the study conducted in USA showed that part-time work (≤20h/week) was reported to be associated with a lower risk of preterm labor [19]. The Japanese study by Shiozaki [22], reported that part-time workers delivered preterm babies more frequently than full-time workers (13.5% vs 1%, $P<0.003$). They attributed that to the levels of decision latitude in female temporary employees were lower than those in permanent employees and so part-time employees experience more job insecurity and poorer prospects for promotion than full-timers.

Concerning the relation between fetal characteristics and occurrence of PTBs, a number of reports have documented the relationship of a male fetus to PTBs such as Shiozaki [22] who stated that male fetus is one of the risk factors of PTB. He concluded that there is a greater synthesis of active prostaglandins in the placentae with male fetuses in a state of inflammation, which may explain the higher incidence of PTBs.

In our study, PTBs was significantly associated with the birth of twins. A study conducted by Jay [23] stated that multi-fetal pregnancies account for about one fifth of all preterm births; 50% of twin births and more than 90% of triplet births are preterm. Some researchers reported that contributing factors of PTBs include births following assisted reproductive therapy and ovulation induction, especially multiple births [24].

Fetal and placental abnormalities appeared more frequently among PTBs than Full-term ones. This can be attributed to concomitant conditions as intrauterine fetal retardation. If placenta was not properly functioning, the fetus may not grow as well as it should [25].

As regards relation between obstetric history and development of PTBs, it was found that parity had an effect, where (PTBs) were more likely to be the first baby rather than the second or more. Some studies considered that the small pregnant uterus in case of the first baby may not be yet well prepared to receive the coming baby and primi parity may be the most important contributing factor to preterm labor. The study conducted by Langhof *et al*. [26] mentioned that the overall proportion of preterm deliveries increased significantly in Denmark, by 22% from 1995 to 2004 and primiparity and multiple birth were the most important contributing factors. They concluded that spontaneous preterm deliveries in primiparous women at low risk rose 51% (from 3.8% to 5.7%) during the same time compared with 20% (2.7% to 3.2%) in multiparous women at low risk.

Short birth interval (less than 18 months) certainly predisposes to PTBs as it leads to nutritional deficiency and incomplete return of normal maternal tissue as stated by Pappasiri *et al*. [27].

Past history of PTBs and abortion had a strong association with the development of PTBs and this may be due to persistence of the same factor which led to that condition e.g. hemorrhage or HTN. and that was confirmed by Jay [23] who stated that previous preterm birth is major risk factor for preterm birth. Another study by Victor *et al*. [28] found no association between past history of PTBs and abortion and development of PTBs. They attributed that to lack of information about distinction between different types of abortion.

CONCLUSION AND RECOMMENDATIONS

In our study, risk factors which were significantly associated with the development of PTBs included low maternal weight, maternal morbidity especially anemia and infection, non or irregular attending antenatal care, medication use during pregnancy especially steroids, primiparity, past history of PTBs & abortion and multi-fetal pregnancy while young maternal age, low education level, part-time working and male fetal sex were found to be insignificantly risk factors of PTBs.

Based on these results one may suggest some recommendations that may help in reducing the rate of preterm deliveries in our society as:

- Epidemiological studies can aid prevention by determining risk factors that may be amenable to control on a population basis and by identifying high risk groups that can be targeted by clinical services.
- Raising socioeconomic standards of mothers especially health status and education.
- Community based research should be conducted to manage the problem of deliveries outside health facilities.

ACKNOWLEDGEMENT

Authors are grateful to Dr.Youssria Abdelhakim Ali, Assistant Specialist of Gynaecology & Obstetrics, Al-Moneera general hospital (MOH), for her participation in completing the practical part of this study besides her valuable remarks on the results interpretation.

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