INTRODUCTION

Prematurity is delivery of the fetus before completion of 37 weeks of gestation following onset of last menstrual period ***(Lee, 2008).*** Its incidence has been increasing in recent years, especially among late preterms; those with gestational ages between 34 and 37 weeks ***(Cloherty et al., 2008).***

The risk of preterm delivery increases in certain conditions such as maternal age at conception below 16 or above 35 years, multiple-gestation, excess maternal activity, acute or chronic maternal illness, prior poor birth outcome, certain obstetric factors as uterine malformations, certain fetal factors as hydrops fetalis, certain races as African Americans, and low socioeconomic status ***(Lee, 2008).***

Prematurity is associated with certain problems related to difficulty in extrauterine adaptation due to immaturity of organ systems. These include respiratory problems such as respiratory distress syndrome and apnea, cardiovascular problems as patent ductus arteriosus, neurologic problems as intracranial hemorrhage, gastrointestinal problems as necrotizing enterocolitis, metabolic problems in calcium and glucose homeostasis, poor temperature control, susceptibility to infections, and hyperbilirubinemia, among others ***(Saari, 2003).***

That is why preterm infants need immediate interventions that may start in the delivery room and in the

neonatal intensive care unit. These interventions aim at thermal regulation, proper ventilation, balanced fluid and electrolyte therapy, proper nutrition, treatment of complications of prematurity, and provision of prophylactic antibiotics ***(Lee et al., 1996).***

Hospital records should be revised, at least, yearly to decide whether these interventional therapies are adequate and effective or not so that they can be improved afterwards ***(Horbar et al., 2002).***

So, we need to revise our hospital records, in the same regard, to evaluate our preterm services and interventional therapies. At the same time, we can calculate the approximate prevalence of the different complications in our preterm population and we can evaluate the adequacy of our records at present.

AIM OF THE WORK

The main objectives of this work are:

- To study retrospectively the admitted premature neonates in Ain Shams University MaternityHospital Neonatal Intensive Care Unit (NICU) over 18 months duration.
- To calculate morbidity and mortality rates during the 18 ms study period.
- Obtained data analysis may shed some light on how to prevent and decrease the occurrence of complications.

DEFINITION AND INCIDENCE

Definition

Preterm birth is the delivery of a baby before 37 complete of weeks of gestation completed. Most mortality and morbidity affects very preterm infants (those born before 32 weeks gestation), and especially extremely preterm infants (those born before 28 weeks of gestation (Fig. 1) ***(WHO, 2006).***

In the past 20-30 years advances in prenatal care have improved outcomes' for infants born after short gestations. The number of weeks of completed gestation that defines whether a birth is preterm rather than a fetal loss has become smaller.

The boundary that required registration as a preterm live birth in the United Kingdom was lowered from 28 completed weeks of gestation to 24 weeks gestation. This boundary varies internationally, however, from about 20 to 24 weeks. Some classification of fetal loss, stillbirth, and early neonatal death for these very short gestations may be unreliable ***(Azikeh, 2003).***

An agreed definition of 'preterm' is essential to enable the epidemiology of preterm delivery to be analyzed, and comparisons between different populations to be made. Although the World Health Organization (WHO) has recommended that preterm be defined as a gestational age of less than 37 completed weeks (259 days) from the first day of the last menstrual period, earlier WHO classifications were by

birth weight, because this is more easily ascertained in countries, where the routine ultrasound dating of pregnancy is not routinely or readily available ***(WHO, 1993; WHO, 2007).***

However gestational age is much more predictive of outcome than birth weight, especially in the developed world, and therefore the definition should be by gestational age if at all possible.

Although terms such as 'very preterm' and 'extremely preterm' have been suggested, at the present time, there is no widespread agreement on these subdivisions of the preterm period ***(Kramer et al., 2000).***

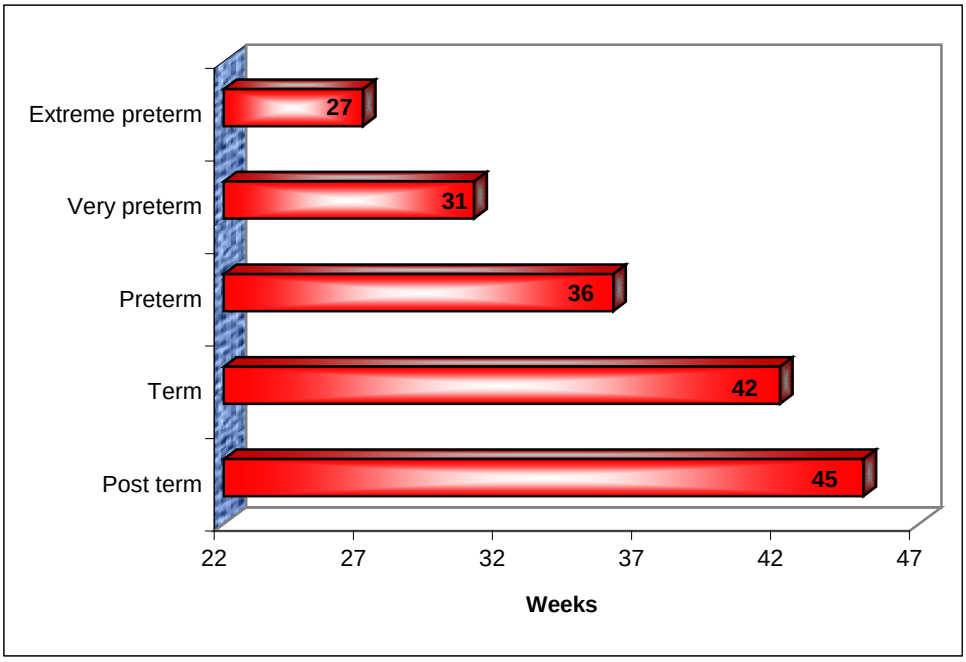

Fig. (1): Definition of preterm live births by completed weeks of gestation

There is also no agreement on the defined lower limit of gestational age at which a delivery might be considered to be a birth, the WHO has suggested only include babies of birth weight more than 500 g, however this would exclude bar of relatively babies of relatively late gestations with severe in utero growth restriction (IUGR).

Many countries have a legal definition of the lowest gestational age at which viability is deemed to be present, and will include all cases delivering above this limit in any statistics produced, but the definition varies greatly depending on the local provision of neonatal intensive care facilities, local definitions of viability and often other cultural factors. Countries with poorly developed neonatal facilities will thus often exclude any babies born below a certain birth weight on the grounds of non-viability, whatever the gestational age ***(WHO, 2006).***

Even within the United Kingdom, where the legal definition of viability is currently 24 weeks gestational age and above throughout the country, there are local differences in the official data produced. For example Scotland considers all deliveries greater than 20 weeks in its official maternity statistics on the premise that the causes of pregnancy loss between 20 and 24 weeks will often be similar to those resulting in extreme preterm delivery at 24 to 26 weeks gestation ***(Pickett et al., 2000).***

Incidence and Secular Trends

Over the past 20-30 years the incidence of preterm birth in most developed countries has been about 5-7% of live births ***(Tucker and McGuire, 2004).***

Preterm delivery affects one in 10 births (11%) in USA and even greater births in developing countries and causes 40-75% neonatal deaths ***(Uma et al., 2007).***

Some evidence shows that this incidence has increased slightly in the past few years (table 1), but the rate of birth before 32 weeks gestation is almost unchanged, at l%-2%. The true incidence of preterm delivery and preterm labor can only be ascertained if a consistent definition is used, and if the data are population based.

The reported incidence of preterm delivery is affected by the method of gestational age assessment, and by the differing definitions of viability used and therefore the registration of every preterm delivery. Further problems occur in the measurement of outcome because of the heterogeneity of preterm birth delivery which may occur near to the 37 week upper limit of gestation where there may be no pathological cause and the baby has relatively few if any problems, or it may occur at the extreme of prematurity at around 24 weeks gestation, where survival rates are poor, and the risk of severe morbidity in those survivors is high ***(Behrman and Butler, 2007).***

Although there is widespread agreement that 'preterm' should refer to a gestational age below 37 completed weeks, there is poor agreement on the definition of the lower limit that defines fetal viability, and on the sub-division of the preterm period into intervals defined by outcome ***(Tucker and McGuire, 2004).***

There is often inaccuracy in the determination of gestational age, especially where there is no facility for routine checking of menstrual dates with early ultrasound scanning. Additionally, the group of women most likely to have inaccurate ascertainment of gestational age is often those women most likely to have the multiple socioeconomic risk factors associated with preterm delivery. These limitations must always be considered when comparisons are made between different countries, and when interpreting epidemiological data on the possible causes and outcomes of preterm delivery ***(Uma et al., 2007).***

With the limited provision of antenatal or perinatal care in developing countries, there are difficulties with population based data. Registration of births is incomplete and information is lacking on gestational age, especially outside hospital settings. Data that are collected tend to give only estimates of perinatal outcomes that are specific to birth weight. These data show that the incidence of low birth weight is much higher in developing countries than in developed countries with good care services ***(Azikeh, 2003).***

In developing countries, low birth weight is probably caused by intrauterine growth restriction. Maternal under nutrition and chronic infection in pregnancy are the main factors that cause intrauterine growth restriction. Although the technical advances in the care of preterm infants have improved outcomes in developed countries with well resourced care services, they have not influenced neonatal morbidity and mortality in countries that lack basic midwifery and obstetric care. In these developing countries, the priorities are to reduce infection associated with delivery, identify and manage pregnancies of women who are at risk, and provide basic neonatal resuscitation ***(Behrman and Butler, 2007).***

In the developed world, the survival rates for premature babies have greatly improved over the past few decades ***(Keirse et al., 1978).*** This improved outcome is largely due to improved neonatal care ***(Azikeh, 2003).***

Neonatal intensive care is expensive because of the cost of sophisticated equipment, constant use of laboratory facilities and high ratio of staff to babies. This is beyond the reach of most developing countries. In Nigeria, the few available neonatal care facilities and personnel are concentrated in the tertiary centers which take care of a very small proportion of their deliveries ***(Etuk et al., 1999).***

Ignorance, poverty and repeated power failure impact negatively on the care of these pre-term infants. The reduction

in perinatal morbidity and mortality from pre-term births, in the short term, lies on the prevention of pre-term delivery.

Approximately 13 million preterm deliveries occur per year worldwide and preterm delivery is the most important determinant of neonatal morbidity and mortality in developed countries and for hospital deliveries occurring in developing countries ***(Kramer et al., 2000; Yasmin et al., 2001).***

Although many promising preventive and therapeutic measures have been put forward, little success has been achieved, with even an increase in preterm deliveries occurring in some circumstances. Preterm delivery is a multifactorial entity or syndrome, whose prevention is unlikely to be achieved with interventions such as nutrition, supplementation or antibiotics prophylaxis ***(Azikeh, 2003).***

The incidence of preterm delivery varies between 5% and 11% ***(Andrews et al., 2000)***. In the developed world the rate in general has been rising slowly or has been static over the past 10 to 20 years, but has fallen even in some developed countries.

In New Zealand the singleton preterm birth rate rose from 4.3% in 1980 to 5.9% in 1999, a rise of 37% ***(Craig et al., 2002).*** Interestingly, the rate rose by 72% in high socioeconomic groups but only by 3.5% in the most deprived groups. This is due to the effects of delayed childbearing in

affluent career-women, and to the increase in assisted reproduction in that group.

In Canada the proportion of births to women aged over 35 years has increased from 8.4% in 1990 to 12.6% in 1996, an increase of more than 50%. Among these women the preterm delivery rate has increased by 14%. It is estimated that 36% of this increase is attributable to delayed childbearing, and there was also a 15% increase in twin rates and a 14% increase in triplet rates ***(Tough et al., 2002).*** This has lead to a reversal of the traditional socioeconomic risk in many western societies.

In the USA preterm delivery affects one in 10 births (11%) ***(Uma et al., 2007).*** Where many infections and other causes of neonatal death have been markedly reduced, prematurity is the leading cause of neonatal mortality at 25% ***(Mathew and MacDorman, 2006; WHO, 2007).***

In Finland, the rate of preterm birth fell from 9% in 1966 to 4.8% in 1986, however the proportion of the preterm deliveries that were spontaneous fell from 97% to 71%, and the iatrogenic cases rose from 3% to 29%. The iatrogenic births were commoner in the lower socioeconomic groups in 1966, but this had been reversed by 1986 ***(Olsen et al., 1995).*** This increase in iatrogenic preterm delivery is due to improvements in neonatal care, and in the detection of IUGR and other fetal problems necessitating early delivery.

Incidence of preterm labor is 23.3% and of preterm delivery 10-69% in India (table 1).

Table (1): Incidence of Preterm Birth and Secular Trends

Country	Preterm labor	Preterm birth	Trend
USA (Martine et al., 2003)	-	12.3 %	Increasing
United Kingdom (Bibby and Stewart, 2004)	10%	7 %	Increasing
Australia (Robert et al., 2003)	14.1 %	5.5 %	Stationary
Sweden (Morten et al., 2005)	-	5.6%	Decreasing
China (Lening et al., 1998)	-	7.4 %	Increasing
Zimbabwe (Shingairai et al., 2004)	-	16.4%	Increasing
India (Uma et al., 2007)	22.0 %	20.9 %	Stationary

(Uma et al., 2007)

The other principal contributing factor to the preterm delivery rate is the increase in multiple births associated with the use of assisted reproduction techniques, and to the rise in iatrogenic preterm delivery of these women ***(Blondel and Kamlnski, 2002).*** Although there had been a decline in twinning rates since the mid nineteenth century, there has been a rise more recently because of the increased use of assisted reproduction and ovulation induction techniques. An improvement in assisted reproduction techniques and reduction of the number of embryos replaced has been introduced over the past five years and can reduce the multiple pregnancy rates ***(Bower and Hansen, 2005).***

Due to continued innovation in neonatal intensive care facilities and obstetric interventions, fetal survival is now possible even at 20 weeks gestation developed countries. However, in even the best setups in developing countries, salvage is rare below 28 weeks of gestation ***(Behrman and Butler, 2007).***

In Egypt, prematurity was the main cause of neonatal mortality 39%, followed by asphyxia (18%), infections (7%), congenital malformations (6%) and unclassified 29% ***(Campbell el al., 2004).*** Generally, the neonatal mortality decreased from 21 per 1000 in 2001 to reach 17 per 1000 in 2004 according to WHO statistics ***(2007).***

In a study involving six developing countries (Egypt among them) stillbirth rate was 12.5 per 1000 births and early neonatal mortality rate was 9.0 per 1000 live births-. Prematurity was the main cause of early neonatal deaths (62%) ***(Ngoc et al., 2006).***

According to UNICEF ***(Warren et al., 2001),*** 12% of live neonates in Egypt were low birth weight, and it was estimated that about one third of such infants are preterm. Another study compared Middle-eastern and American mothers as regards common factors for premature birth e.g. vaginal infections, stress, smoking, drug use, and protein intake. Factors significantly related to preterm birth were almost identical in the two groups. Smoking was related only in the American group. These data suggest risk factors are similar across nations and ethnic groups ***(Badr et al., 2005).***

ETIOLOGY AND PATHOPHYSIOLOGY

There are many factors linked to premature birth. Some directly cause early labor and birth, while others can make the mother or baby sick and require early delivery (Fig. 2).

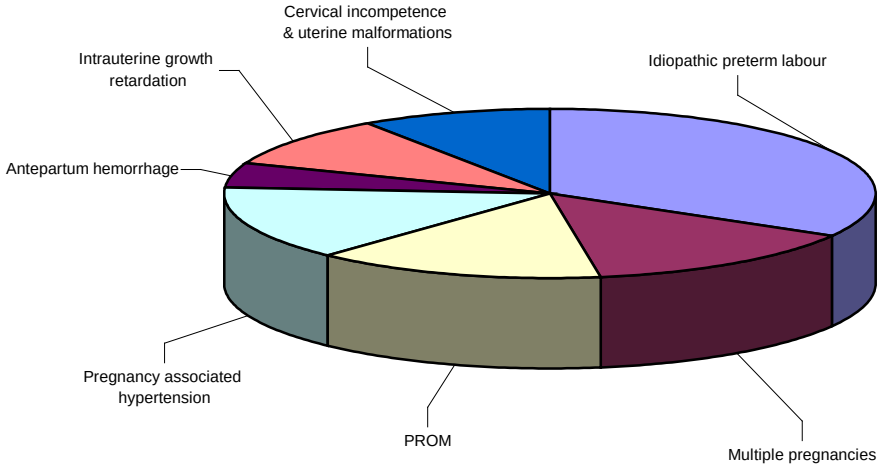

Fig. (2): Causes of preterm birth ***(Tucker and McGuire, 2005).***

The following factors may contribute to a premature birth Maternal factors

- Chronic medical illnesses as high blood pressure, maternal diabetes mellitus and other chronic medical diseases.
- Preeclampsia
- Infections and periodontal diseases

- Maternal age > 35 and age < 18
- Abnormal structure of the uterus and cervical incompetence
- History of prior preterm delivery/ prior miscarriage or difficult, conceiving
- Anxiety, single mothers and socioeconomic state
- Drug use, alcohol and tobacco.
- Miscellaneous causes : BMI, obesity and nutrition
- Idiopathic or spontaneous preterm labor

(Pickett et al., 2000)

Factors involving the pregnancy

- Abnormal and decreased function of the placenta.
- Antepartum hemorrhage, placental abruption or placenta previa.
- Premature rupture of membranes (amniotic sac), polyhydraminos (more than 2000cc), or oligohydramnios (less than 500cc).

(Tucker and McGuire, 2005)

Factors involving the fetus

- When fetal behavior indicates the intrauterine environment is not healthy
- Multiple gestation (twin, triplet or more)
- Congenital anomalies

(Uma et al., 2007)