

**PREINDUCTION ULTRASONOGRAPHIC
MEASUREMENTS AS A PREDICTOR OF SUCCESSFUL
INDUCTION OF LABOR IN PROLONGED PREGNANCY
IN PRIMIGRAVIDAS**

Thesis

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إيفاءً جزئياً لشروط الحصول على درجة
ماجستير في التوليد وأمراض النساء
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INTRODUCTION

Prolonged pregnancy is a real problem in modern obstetrics. It causes anxiety and distress for many women, their families and obstetricians. This may be exacerbated by poor counseling (*Sawyer et al., 1999*).

There is no obvious cause for the prolongation of pregnancy as the onset of labor is not fully understood. There is no consensus about the exact definition of prolonged pregnancy. Most authors depend on the completed 41 weeks of gestation from the first day of last menstrual regular period. The prolonged pregnancy accounts for 10% of all pregnancies. Incidence of prolonged pregnancy decreased with the use of ultrasound early in pregnancy avoiding false dating. A pregnancy becomes at risk at the end of 41 weeks of amenorrhea (*Ulmstem et al., 2001*).

Prolonged pregnancy carries many problems for pregnancy, labor and fetal outcome, namely; oligohydramnios which may be indicator of poor placental reserve, meconium stained liquor with the potential danger of meconium aspiration post-partum macrosomia with shoulder dystocia with the possibility of obstructed labor, fetal distress during labor and increased preinatal morbidity and mortality (*Chan et al., 2000*).

The management of prolonged pregnancy remains controversial. Despite many trials there is still no consensus regarding the most appropriate management of this difficult situation, thus in many instances the decision as to whether to intervene in prolonged pregnancy is based on tradition and emotion rather than scientific data (*Chan et al., 2000*).

Induction of labor is carried out in approximately 20% of pregnancies. The commonest indication for induction is prolonged pregnancy and several studies have shown that induction, compared to expectant management, is associated with a substantial reduction in perinatal mortality. However, approximately 20% of women having induction end by cesarean delivery. The traditional method of predicting whether an induced labor will result in successful vaginal delivery is based on the preinduction favorability of the cervix as assessed by the Bishop score. However, this assessment is subjective and several studies have shown a poor predictive value for the outcome of induction (**Pandas et al., 2001**).

In women undergoing induction of labor, pre-induction sonographic assessment of cervical length, posterior cervical angle, and occipital position is superior to the Bishop score in the prediction of outcome of labor (**Rane et al., 2004**).

Using pre-induction sonographic parameters and maternal characteristics to predict the outcome of induction enables the clinician to provide precise information to the mothers, and accordingly, plan further management of the pregnancy (**Rane et al., 2004**).

Induction of labor at 41 weeks is associated with less intrapartum fetal compromise, meconium-stained liquor (MSL) and macrosomia (> 4,000 g) (**Gomezoglu et al. 2006**).

AIM OF THE WORK

To determine if some ultrasonographic measurements as the cervical length, the posterior cervico- uterine angle, the fetal occiput position, the estimated fetal weight and degree of flexion of the head are good predictors for successful induction of labor in cases of prolonged pregnancy in primigravidas.

REVIEW OF THE LITERATURE

Chapter (1) Postterm pregnancy

Definition

The expression postterm, postdate, postmature are often loosely used interchangeably to signify pregnancies that have exceeded a duration considered to be the upper limit of normal. Imprecision in their use, along with varying definition of the upper limit of normal pregnancy, make a search literature on postterm pregnancy be wildering (**Cunningham *et al*, 1997**).

The gestational period for a developing human embryo is usually calculated from the first day of the last menstrual period (L.M.P). The average expected date of delivery (E.D.D) is 280 days $\pm$ 14 days (40 $\pm$ 2 weeks) (**Hobart *et al*, 2000**).

Definition in the literature have ranged from completed 41 weeks (**Rayburn *et al*, 1997**) to completed 43 weeks (**Beischer *et al*, 1996**). other studies considered a pregnancy postdate at the beginning of the 41 weeks from the last menstrual period (**Sachs and Freidam, 1986**).

The best name to use for a pregnancy that advances beyond 42 weeks is postterm. The term postdatism is inadequate because there is no definition of the dates to which the term refers (**Arias *et al*, 2001**).

Postdate pregnancy has usually been defined on the bases completed 42 weeks from the first day of L.M.P. or 40 weeks from the time of conception (**American College of Obstetricians and Gynecologists, 1995 & Beazley, 1995**).

Another concern is about the terminology: the terms "Postdate pregnancy" and "Postterm pregnancy" are synonymous and they are defined as pregnancy exceeding 294 days from the last menstrual period.

The terms "Postmaturity", "Dysmaturity" and "Placental dysfunction syndrome" all refer to a condition that result in infants with late onset wasting and manifestations of intrauterine nutritional deprivation, which are not unique to prolonged pregnancy (**Sims *et al*, 2001**).

The term "postmaturity syndrome" is the best expression to be used when one is referring the postdate infant with this problem (**Sims *et al*, 2001**).

Arias *et al* (2001) mentioned that the term prolonged is used to refer to the pregnancies advancing beyond the expected date of delivery pregnancies that advance beyond 42 weeks.

Incidence

The incidence of postdating varies according to the definition used, and more important to the dating. The stricter the dating criteria used in confirming one's due date, the lower is the probability that a postterm pregnancy will be encountered (**Phelan *et al*, 2001**).

The postterm pregnancy occurs in 2.5-12% of pregnancies depending on the method used for measurements. Most published agreed that 80% of births occur between 38 and 42 weeks, 3.5-14.3% occurs beyond 42 weeks and 4.4-7.3% beyond 43 weeks (**Montan *et al*, 2001**).

The reported frequencies from 4-14 with an average about 10%. The incidence of subsequent postterm birth increases from 10 to 27% if first birth was postterm and to 39% if there had been 2 previous successive postterm deliveries (**Bakketeig *et al*, 2000**).

Aetiology

Various theories have been advocated to explain pathogenesis of the postdate pregnancies as the actual physiologic mechanism responsible for a prolonged pregnancy has not been elucidated and until the mechanisms for the initiation and maintenance of labor are defined more clearly the etiology of the postdate pregnancy will probably remain obscure (**Ahn *et al*, 2002**).

Fetal anencephaly was frequently associated with a postterm pregnancy. This was believed to be due to pituitary adrenal axis insufficiency. However, with nowadays routine screening with maternal serum alfa-fetoprotein in early pregnancy, this should be a rare cause for a postdate pregnancy today (**Ahn *et al*, 2002**).

Normally, fetal plasma corticosteroids levels rise prior to onset of labor and failure to elevate plasma cortisol in the fetus contribute to prolonged pregnancy. Whereas intra-amniotic administration of steroids in postterm pregnancy induces labor (**Georgieff *et al*, 2000**).

Placental salfatase deficiency and extrauterine pregnancy are rare conditions associated with postdate pregnancy. The former, an X-linked recessive disorder, characterized by a male fetus, low estriols and prolonged pregnancy. With estriols being used less frequently today, this disorder will probably not be diagnosed as readily (**Haddad *et al*, 1998**).

Extrauterine pregnancies and their relationship to prolonged pregnancy remain obscure. Many authors believe that the pregnancy is prolonged because the uterine factor in labor has been removed, while others believe that pituitary-adrenal relationship have been affected by the extrauterine fetal existence. In modern obstetrics, extrauterine pregnancy should be similar to anencephaly, a historical association of the postdate pregnancy (**Ahn *et al*, 2002**).

It is now clearly established that prostaglandin plays a crucial role in the onset and maintenance of human labor. Thus, it is not unlogic that suppression of endogenous prostaglandin synthesis by prostaglandin inhibitors intake, for example aspirin, during the last 6 months of pregnancy may be resulting in delaying the onset of labor. On the other hand, there is increasing evidence that formation of prostacyclin, and possibly thromboxane, may be of vital importance for placental function and fetal wellbeing (**Crowley *et al*, 2001**).

Some factors that influence the metabolic pathway of arachidonic acid and affects either prostaglandin synthesis, prostacyclin production, or both, could well be behind some of variable manifestation of postterm pregnancy (**Timonen *et al*, 1966**).

Risk factors

Because of the obscure definite cause of prolonged pregnancy, many studies were done, trying to look for clues to indicate which patients are at risk. A number of clinical factors had been suggested and examined as risk factors. However, these factors can be helpful guideline, but do not provide the criteria to make a definitive diagnosis of prolonged pregnancy (**Campbell *et al*, 1988**).

The influence of maternal age on prolonged pregnancy had been described by many reports dating back to the sixties. Some studies found a steady decrease in the incidence of postterm pregnancy with advancing age. Similar findings have been reported by other investigators (**Beischer et al, 1996**).

All recent studies agreed that advancing maternal age does not appear to influence the incidence of postterm pregnancy. In the mean time, all these recent studies stated that their findings have been influenced by early intervention (**Bakketeig et al, 2000**).

Parity, similar to maternal age does not appear to influence the incidence of postdate pregnancy (**Ahn and Phelan, 1998**). With maternal age held constant, prolonged pregnancies were encountered more frequently among primigravidas and women of high parity (4 or more) (**Eden et al, 2000**).

The incidence of prolonged pregnancies in multigravidas and primigravidas may vary among specific age group. Below the age of 30 years, the incidence of primigravidas is higher than multigravidas, with reversal of the incidence over the age of 30 years, and by the age of 35 years, the incidence of multigravidas is almost 4 times as compared with that for primigravidas (**Sawyer et al, 1999**).

The incidence of prolonged pregnancy is inversely related to the pregnant women's socio-economic status and education. This means that's the lower her level of education or socio-economic status, the greater the likelihood she would have a postdate pregnancy. Still, this relationship has limited clinical usefulness. For example, it may be more indicative of inaccurate early landmarks due to delayed access to prenatal care rather than due to a person's socio-economic status (**Nwosu et al, 1996**).

Women who deliver a postterm infant weigh significantly more than those gravidas who deliver term infants. These results do not lend themselves to the prediction of those patients who will become postdate. The maternal weights at delivery overlap considerably, however, this difference does appear to correspond with the higher fetal and placental weights observed in these pregnancies (**Eden *et al*, 2000**).

Geographical studies have revealed significant differences in the incidence of postdate pregnancies among Greek and Italian patients as opposed to the Australians. Although there may be slight variations in the incidence of postdate pregnancies among various ethnic groups, there does not appear to be group with a consistently higher rates than another. Another racial study stated the distribution of postdate pregnancies among whites and blacks were found to be similar (**Ahn *et al*, 2002**).

A study conducted in France, found that the average length of gestation about 5 days shorter in black population than white population. The complication of postmaturity occur sooner in black fetuses and they suggested antepartum fetal surveillance for signs of fetal compromise, perhaps by setting the estimated date of confinement at 275 days after the L.M.P., rather the conventional 280 days (**Papiernik *et al*, 1996**).

Lastly, as demonstrated, several identifiable factors lend themselves to predicting the possibility of postdate pregnancy. Unfortunately, with the exception of the previous prolonged pregnancy, the clinical usefulness of these information is limited (**Ahn *et al*, 2002**).

Complications of postdate pregnancy

The incidence of obstetric and neonatal problems increases in pregnancies past 280 days of gestation, for each week of gestation after 40 weeks the incidence of these complications increases significantly. In