Original Article

DIURNAL INFLUENCE TO THE ONSET
OF PRETERM DELIVERY

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ABSTRACT

Objective: To analyse the onset of uterine contractions and preterm delivery in order to document any diurnal influence.

Methodology: Hospital records of the patients admitted with the diagnosis of preterm labor were retrieved from January 2003 to February 2007 from Sobhraj Maternity Hospital, Karachi. Time of onset of uterine contractions establishment of preterm labor parity and gender of the baby was noted. Data was analyzed by SPSS version 10 for descriptive and inferential statistics.

Results: During the study period, 632 preterm deliveries were recorded. Precise timing of onset of uterine contractions was available in 340 (38.33%) deliveries. Uterine contraction leading to labor started from 2:00AM to 5:00AM and 397 babies delivered during the night / early morning (8:00 PM to 8:00 AM) and 235 babies were delivered during day (8:00AM to 8:00PM) [chi2 = 7.908; p= 0.004]. Among all babies delivered during night / early morning 311 (49.2%) were born between 2:00AM to 8:00AM.

Conclusion: Preterm labours demonstrate diurnal rhythm. In most of the women, contractions started between 2:00AM - 5:00AM and most of the deliveries occurred from 2:00AM - 8:00AM.

KEYWORDS: Preterm labour, Preterm delivery, Diurnal rhythm.

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INTRODUCTION

Preterm labor refers to the onset of uterine contractions of sufficient strength and frequency to effect progressive dilatation and effacement of cervix between 20 and 37 weeks of gestation.[1] It is often conjectured that frequency of birth vary with the time of the year and the time of the day.[2] As far as diurnal rhythms of labor onset in women are concerned, a clear peak occurs during night hours, although the mechanisms actually determining the onset of labor are still unexplained.[3] Because uterine contractions and the labor-inducing hormone oxytocin also show strong diurnal rhythms, a leading role of the hypothalamus/pituitary is likely.[4]

Preterm labor complicates 5-10% of pregnancies and is a leading cause of neonatal morbidity and mortality.[5] It is a major public health problem in terms of loss of life, long-term

disability and have health care costs both in the developing and the developed world.[6-8] Whether preterm labour represents an early maturation of a physiological process or alternatively, an entirely pathological process, is uncertain. It has also been suggested that late onset preterm labour may represent a physiological mechanism whilst early preterm labour is a pathological mechanism.[9]

In hospital practice, times of labor and deliveries are often not in a favorable phase with the working hours. This is especially important in term of preterm labor as its effective management will improve neonatal outcome and will have impact on healthcare costs. This study was done to document the timing of onset of uterine contractions when preterm labour resulted in delivery and also timing of preterm deliveries.

METHODOLOGY

From January 2003 to February 2007, hospital records of all patients admitted with the diagnosis of preterm labour was retrieved from Sobhraj Maternity Hospital, Karachi. The recorded time of onset of uterine contractions was obtained. Only precise times recorded by doctor or nursing staff were included in the analysis. The first uterine contraction time was approximated to the nearest hour. Timing of onset of preterm labor was recorded with gender of baby along with parity of women. Data was analyzed by using SPSS version 10 for descriptive and inferential statistics.

RESULTS

A total of 10,544 deliveries were recorded during the three years period. Total 887 women were admitted with the diagnosis of pre-term labour and out of them 632 were delivered (309 male and 323 female babies). Two hundred twelve (33.5%) women were primi gravid and 157 (24.8%) women were multigravida [Table-I]. Precise timing of onset of uterine contractions was available in only 340 (38.33%) deliveries which shows peak in the early morning [Figure-1].

Table-I: Parity of patients with preterm labour (n=632)

Parity	n (%)
Primi Gravida	212 (33.5)
2nd Gravida	103 (16.3)
3rd Gravida	116 (18.3)
4th Gravida	44 (6.9)
Multi Gravida	157 (24.8)

In all preterm deliveries, 397 babies were delivered during the night / early morning (8:00 PM to 8:00 AM) and 235 babies were delivered during day (8:00AM to 8:00PM) [chi2 = 7.908; p= 0.004]. Among all babies delivered during early morning 311 (49.2%) were born between 2:00AM to 8:00AM [Figure-2].

DISCUSSION

Our results showed there is a diurnal variation of preterm labour and most of them delivered during late night / early morning when the staff both medical as well as paramedical was small in number. Prevention and treatment of preterm labor is essential to reduce adverse neonatal and infant outcome and to improve survival and quality of life. This highlights the importance of increase availability of resources during late night and early morning so that proper management of preterm deliveries could be ascertained. Many developing countries like Pakistan are unable to cope with the healthcare costs associated with managing neonates that are born preterm, resulting in higher and often unacceptable neonatal morbidity and mortality.

Lindow et al[9] analyzed 425 cases of preterm labour and reported that there was significant difference between number of women who went into labour during night compared with those during day time (p<0.0001). There was no difference noted between gender of baby and singleton or multiple births. In their study 42% of women delivered who went into labour in six hour period between midnight and 6 AM. In our study, 311 (49.2%) of the women had delivered between 2:00AM to 8:00AM [Figure-2].
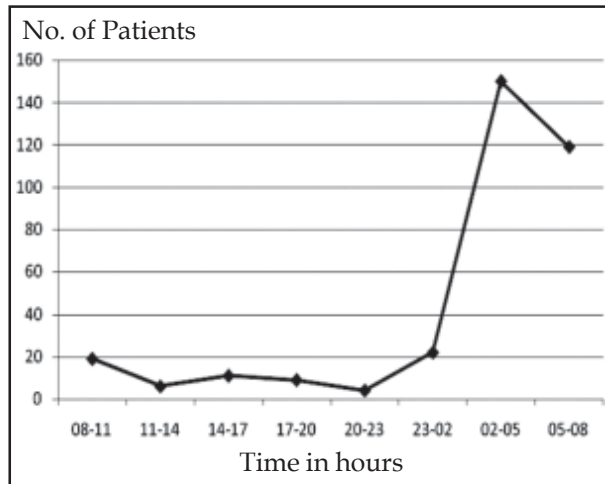
Figure-1: Number of patients with pre-term onset of contractions (n=340)

Figure-2: Number of women with preterm delivery (n=632)

Fraser WD et al[10] found that in women having spontaneous onset of labour or premature rupture of the membranes there is a marked diurnal variation in times of admission to hospital. Analysis of 4755 nulliparous women with single pregnancies in cephalic presentation at term indicated that they presented in labour or with premature rupture of the membranes nearly twice as frequently during the night as during the evening. The peak hours for delivery were late morning and afternoon.[10]

A very interesting study was published from Switzerland in 2008 by Lerchl et al[11] in which birth dates from almost three million babies born between 1969 and 2005 in Switzerland were analyzed for the weekday of birth. A very marked non-random distribution was discovered with decreasing numbers of births on weekends. While most of this weekend births missing rate is due to fewer births on Sundays (up to "21.7%), the downward trend is primarily a consequence of decreasing births on Saturdays (up to "14.5%). For 2005, these percentages mean that 3,728 fewer babies are born during weekends than could be expected from equal distribution. The increasing absence of births during weekends is discussed as being a consequence of decreasing numbers of caesarean sections and elective labor induction, which in Switzerland reached 29.2 and 20.5%, respectively, in 2004. Another interesting observation

was reported by Goldstick et al.[12] while investigating the diurnal rhythms of 'urgent' operative deliveries (caesarean sections and operative vaginal delivery) and found a strong diurnal rhythm with highest frequencies during the normal working hours. The rate of urgent caesarean deliveries increased significantly between 8 a.m. and 2 p.m. They concluded that perhaps this effect is caused by varying definition of 'urgency' according to the time of the day and is man made.

Diagnosing preterm delivery is equally important as managing it. In most reports, only 30-40% of women hospitalized for spontaneous preterm labour experienced a preterm birth, suggesting a low positive predictive value of clinical diagnosis.[13] Transvaginal ultrasonographic scanning (TVUSS) of cervical length has shown a high sensitivity for preterm birth, 90-100% for preterm birth before 33-35 weeks, using a liberal cutoff at 30 mm. Assessment of cervico vaginal fetal fibronectin (FFN) levels has shown a sensitivity of about 80%. Adding FFN assessment to TVUSS might contribute significantly to the prediction of preterm birth.[14] Home uterine activity monitoring (HUAM) is based on the principle of toco dynamometry has created a lot of interest and excitement among obstetricians when it was first introduced.[6] Uterine contractions occurring before labor have been studied using this unit which documented the hourly number of

contractions which occurred prior to labor from 24 weeks onwards.[15] It was found that there is a strong diurnal variation to non-labour uterine contractions which increases as gestational age increases. Uterine contraction frequency reached a maximum in the early hours of the morning. The authors also noted that rest decreased uterine activity, while sexual intercourse increased it. A similar nocturnal rise in non-labor uterine activity was reported by Vercoustre L.[16] However, a large randomized trial involving 2422 patients showed no benefit of HUAM in predicting preterm labor.[17] The etiology of increasing myometrial activity and increasing myometrial sensitivity to oxytocins is due to rising number of oxytocin and prostoglin receptors in myometrium as pregnancy advances. Development of gap junctions and rising production of prostaglandines from decidual tissue is a normal developmental change with increasing gestational age.

Unfortunately, the incidence of preterm labor has changed very little over the last 40 years and uncertainties still persist regarding the best strategies for its management.[6,18] It has been widely recognized that its prevention and effective management will improve neonatal outcome and will have a profound impact on societal and long-term public healthcare costs.[1] Our study highlights an important aspect of management of preterm deliveries because most of the women have their onset of labour and consequent birth at odd hours when the health care facilities in any hospital are very meager. There is need of increase in vigilance at these odd hours by adequate number of properly trained staff for the management of preterm labour.

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