

# Infectious Factor in Premature Labour and Neonates' Fates

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**Keywords:** premature labour, perinatal mortality, infections

**Abstract:** Introduction: Although the frequency of premature labour in high developed countries is established in only 6–8% of all labours, it is the cause of perinatal mortality in about 75%. It is known that the beginning of the labour is a very complicated process, in which both mother and fetus take part, but as one of the most important factors is regarded infectious factor. Bacteria and their endotoxins induce increased prostaglandin's synthesis, which stimulate uterine contracting activity. Material, Methods and Results: Between 1997-01-01 and 1999-07-31 in the Septic Ward of the Department of Obstetrics and Gynaecology, Jagiellonian University Hospital in Cracow, 727 labours took place. 151 of all labours were premature (20,7%). Premature rupture of membranes was identified in 38 pregnant women (5,2%). At the moment of admission on the ward the dilation of the external cervical os was as follows: no dilation – 78 pregnant women (50,03%), < 1 cm – 42 (27,81%), from 1 to 3 cm – 19 (12,58%), from 3 to 5 cm – 8 (5,29%) and > 5 cm – 6 (3,97%). In spite of tocolitic management (Partusisten, Magnesium sulphate), between 24 and 37 weeks of gestation, 151 women laboured, in which in 87 cases (57,61%) it was spontaneous labour, in 20 (13,24%) – labour by speculum using, in 24 (15,89%) by caesarean section, in 19 (12,58%) – pharmacologically supported vaginal delivery, and manual fetal extraction procedure in 1 case (0,062%). 113 neonates was born alive (74,83%), in which 9 with congenital defects (5,96%) and 38 was stillborn (25,16%). The neonates' estimation by using Apgar scale was as follows: 8–10 points – 55 neonates (48,68%), 5–7 points – 24 (21,24%), < 5 points – 34 (30,10%). Conclusion: Premature labour is associated with high rate of perinatal mortality and congenital defects.

**Zusammenfassung:** *Der Infektionsfaktor bei vorzeitigen Wehen und die Schicksale der Neugeborenen.* Einführung: Obwohl die Häufigkeit vorzeitiger Wehen in den entwickelten Ländern sich bei 6–8% aller Geburten eingependelt hat, ist sie für 75% der perinatalen Mortalität die Ursache. Es ist bekannt, daß der Anfang der Wehen einen komplexen Prozeß darstellt, an dem beide, Mutter und Fötus, beteiligt sind, wobei einer der besonders wichtigen Faktoren der Infektionsfaktor ist. Bakterien und ihre Endotoxine führen zu einer Steigerung der Prostaglandin-Synthese, die die uterine Kontraktilität stimuliert. Material,

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Methoden und Ergebnisse: zwischen dem 1.1.1997 und dem 21.7.1999 fanden in der septischen Station der Abteilung für Geburtshilfe und Gynäkologie des Krankenhauses der Jagiellonischen Universität in Krakau 727 Geburten statt. 151 von diesen Geburten waren vorzeitig (20,7%). Vorzeitiger Blasensprung wurde bei 28 schwangeren Frauen (5,2%) diagnostiziert. Im Moment der Einweisung in die Klinik stellte sich die Erweiterung der äußeren Cervixöffnung wie folgt dar: keine Erweiterung – 78% der schwangeren Frauen (50,03%), < 1 cm – 42 (27,81%), zwischen 1 und 3 cm – 19 (12,58%), zwischen 3 und 5 cm – 8 (5,29%) und > 5 cm – 6 (3,97%). Trotz der tokolytischen Behandlung (Partusisten, Magnesiumsulfat) zwischen der 24. und 37. Schwangerschaftswoche kam es bei 151 Frauen zu einer Frühgeburt: bei 87 Fällen (57,61%) kam es zu spontanen Wehen, bei 20 Fällen (13,24%) begannen die Wehen im Zusammenhang mit der SpekulumEinstellung, bei 24 Fällen (15,89%) fand eine Kaiserschnittentbindung statt, in 19 Fällen (12,58%) eine medikamentös unterstützte vaginale Geburt und in einem Fall (0,062%) fand eine manuelle Extraktion des Fötus statt. 113 Neugeborene wurden lebend geboren (70,83%), wobei 9 kongenitale Mißbildungen hatten (5,96%) und 38 waren Totgeburten (25,16%). Die Apgar-Einschätzung war wie folgt: 8–10 Punkte – 55 Neugeborene (48,68%), 5–7 Punkte – 24 (21,24%), < 5 Punkte – 34 (30,10%), Konklusion: Frühgeburten sind in beträchtlichem Ausmaß mit perinataler Mortalität und angeborenen Mißbildungen verbunden.

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## Introduction

Although the estimated frequency of premature labour in highly developed countries is only 6–8% of all labours, it is the cause of perinatal mortality in about 75%. It is known that the beginning of the labour is a very complicated process, in which both mother and fetus take part [10, 11], but the infectious factor is regarded as one of the most important ones. Bacteria and their endotoxins induce increased synthesis of prostaglandins, which stimulate uterine contracting activity [1, 2, 5, 6, 15].

It is puzzling that frequency of preterm labour, both in the United States and in many western European countries, has not decreased in the recent 10 years. Therefore, it is necessary to put some precise non-invasive methods into practice to diagnose preterm labour [2, 5, 7, 10, 11, 16, 18]. Methods used so far do not fully satisfy, since one third of pregnant women admitted to the hospital with diagnosis of preterm labour deliver in 24–48 hours. Administration of  $\beta$ -mimetics increases the number of pregnant women with stopped uterine contracting activity. On the other hand, too rashly diagnosed preterm labour and administration of these drugs expose pregnant women to some uncomfortable side effects caused by  $\beta$ -mimetics. However, administration of steroids to patients with imminent preterm delivery significantly decreased neonatal mortality and morbidity caused by respiratory distress syndrome, cerebral ventricle haemorrhage and necrotic ileitis [1, 9, 12]. Since among the commonest causes of preterm labour are vaginal and cervical infections in pregnancy, it is necessary to evaluate and diagnose pathological state called Bacterial Vaginosis (BV) [5].

The aim of our work is clinical analysis of preterm labours and neonates' fates born before term in the Septic Ward of the Department of Obstetrics and Gynaecology of the Jagiellonian University.

## Material and Methods

Between January 1 1997 and July 31 1999, 727 labours took place in the Septic Ward of the Department of Obstetrics and Gynaecology of the Jagiellonian University in Cracow, 727 labours. 151 of all labours were premature (20.7%). Such high percentage of preterm labours is an effect of admitting most pregnant women with imminent preterm labour to this ward. The average age of the patients was 29, most of them (54.3%) living in towns. Pregnant women with secondary school education predominated – 101 (66.88%). 34 patients (22.53%) had high education and – 16 (10.59%) had primary school education. The enquiry into their profession revealed that the number white- and blue-collar workers among patients was almost identical, 47 (31.13%) and 48 (31.78%) respectively; however the majority were unemployed women – 56 (37.09%). 31 patients (20.52%) had had spontaneous abortion in previous pregnancies, and – 19 (12.58%) had had preterm labour. Imminent preterm labour was diagnosed according to the definition announced by M. Klimek et al., in which following parameters are taken into consideration: uterine contracting activity appearing every 10 minutes, condition of the cervix and fetal membranes, presence of bleeding, pains in hypogastrium, pains like during menstruation and increased vaginal discharge [9].

## Results

59 (39.7%) patients delivered on term. Premature rupture of membranes was diagnosed in 38 cases (25.16%) on admission to the hospital. Table 1 describes the dilation of external cervical os at the time of admission. In most cases (50.33%) it was closed, in 27.81% cases it was dilated less than 1 cm. Modes of labour are summarized in Table 2: in our material spontaneous labours predominated – 87 cases (57.61%), caesarean section was performed in 24 cases (15.89%), speculum using – in 20 (13.24%), augmentation of labour by administration of Oxytocin – in 19 cases (12.58%) with secondary weakness of the uterine contracting activity in an advanced first stage of labour. Manual extraction was done in only one case (0.062%), because of breech presentation.

116 patients (76.82%) had tocolitic management to stop uterine contracting activity, including 85 cases (56.29%) by Magnesium sulfate and 31 cases (20.52%) by Partusisten. 35 patients had no tocolitic management because of an advanced first stage of labour and premature rupture of membranes.

In spite of tocolitic management preterm delivery occurred in the examined population of pregnant women admitted to the hospital with the diagnosis of imminent preterm labour and 113 (60.17%) neonates were born alive and 38 (25.16%) – still. Table 3 describes infection types in detail, which were diagnosed in the group of neonates born alive. The most often, in 20 cases, it was pneumonia and in 19 cases – mixed infections described as early infections. Table 4 summarizes the commonest etiological factors found in newborns. Predominantly it was *Staphylococcus epidermidis* – 24 cases and *Pneumocystis carini* – 16 cases. Table 5 shows the most frequent antibiotics used in the treatment of neonates' infections. They included Amikin, Pipril and Vankomycin. 7 (6.19%) of 113 neonates born alive died in the first week.

**Table 1.** The dilation of the external cervical os at the moment of admission on the ward.

| Dilation | No of patients | %     |
|----------|----------------|-------|
| Closed   | 76             | 50.33 |
| < 1 cm   | 42             | 27.81 |
| 1–3 cm   | 19             | 12.58 |
| 4–5 cm   | 8              | 5.29  |
| > 5 cm   | 6              | 3.97  |

**Table 2.** Mode of labour.

| Mode of labour                    | No. | %     |
|-----------------------------------|-----|-------|
| Spontaneous                       | 87  | 57.61 |
| By speculum using                 | 20  | 13.24 |
| Caesarean section                 | 24  | 15.89 |
| Augmentation of labour (Oxytocin) | 19  | 12.58 |
| Manual extraction                 | 1   | 0.062 |

**Table 3.** The kind of neonates' infection.

| Infection         | No. |
|-------------------|-----|
| Early infection   | 19  |
| Late infection    | 15  |
| General infection | 14  |
| Lung infection    | 20  |
| Total             | 68  |

### Comment

Prevention of preterm labour is one of the most important problems of contemporary obstetrics at present [13, 17]. This problem is not only important but also extremely difficult, since etiology of preterm delivery is very complicated and unknown in about 40% of cases. Low social and economic status connected with low personal hygiene standard and negligence in prenatal care are mentioned as a factor which stimulates preterm delivery [20]. This factor is confirmed in our analysis, in which as many as 37.09% of pregnant women were unemployed. Other stimulating factor is age: too young – below 20 years and too advanced – over 35 years. Among the examined cases there were 35.77% of women of this group. Advanced age of women in labour seems to be more burdening, because of occurrence of uterine myomas which increases the frequency of preterm labours by more than twice, which is up to 15–20%. Unfavourable obstetric past, especially abortions and preterm labours in previous pregnancies, is a very important contributing factor [12, 14]. Also in our material this percentage was high and amounted to 33.1%.

**Table 4.** The most frequent etiologic factors in neonates' infections.

| Etiologic factor           | No. of infections |
|----------------------------|-------------------|
| Staphylococcus epidermidis | 24                |
| Pneumocystis carini        | 16                |
| Klebsiella                 | 10                |
| Enterococcus               | 8                 |
| Streptococcus              | 5                 |
| Chlamydia                  | 5                 |
| Total                      | 68                |

**Table 5.** The most frequent antibiotics used in the treatment of neonates' infections.

| Antibiotic  | No. of cases |
|-------------|--------------|
| Amikin      | 33           |
| Pipril      | 22           |
| Wankomycyna | 12           |
| Tobramycyna | 11           |
| Unasyn      | 11           |
| Meronem     | 11           |

Results of our clinical analysis have confirmed the known fact that preterm labour is connected with very high perinatal mortality of neonates and with possibility of stillbirth or with malformation [9, 19]. In our material 38 neonates were stillborn. In most of these cases pregnant women were admitted to the hospital with diagnosis of fetal death. From among 113 neonates 9 had malformations (5.96%), which required immediate surgical intervention. To a large extent preterm labour also influences neonates' condition at birth estimated according to Apgar scale. In our material only 55 newborns (48.68%) scored 8 to 10 points, 24 (21.24%) – 5 to 7 point and 34 (30.10%) – below 5 points at birth.

One of the most important problems in preterm labours is high morbidity rate in neonates born alive. Early and late infections predominate including general and upper respiratory tract infections which are very difficult to cure.. We diagnosed various infections in 68 neonates (60.17%). All of these neonates were under intensive care with positive results. The large improvement of perinatal care is associated with proper prenatal care such as carrying out diagnostic investigations including mainly bacteriological examination of vaginal and cervical secretion and urinalysis [3, 4, 8]. These examinations should be performed to diagnose some infections of pregnant women and to administer selective therapy. Early diagnosis and proper management will prevent the cascade of biochemical processes and the activation of the synthesis of prostaglandins by bacterial toxins, which stimulate uterine contracting activity leading to preterm labour and dramatic complications in baby's prenatal development.

## Conclusion

Premature labour is associated with high rate of perinatal mortality and congenital defects.

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