



Contents lists available at ScienceDirect

Women and Birth

journal homepage: www.elsevier.com/locate/wombi



ORIGINAL RESEARCH – QUALITATIVE

Maternal stress after preterm birth: Impact of length of antepartum hospital stay

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ARTICLE INFO

Article history:

Received 27 October 2015

Received in revised form 19 April 2016

Accepted 20 April 2016

Keywords:

Maternal stress

Prematurity

Antepartum hospital stay

ABSTRACT

Background: Preterm birth is associated with increased parental stress, worry, and anxiety, and affects parental–child interactional behaviour.

Aim: To evaluate the influence of length of antepartum hospital stay on maternal stress after the birth of a preterm infant.

Methods: A prospective two-centre pilot case–control study was performed at two tertiary level Neonatal-Intensive-Care-Units (NICU). Mothers of preterm infants <36⁺⁰ weeks of gestation admitted to the NICUs were included. The stress of mothers with length of antepartum hospital stay <12 h ($n = 20$) were case-matched and compared to that of mothers with length of antepartum hospital stay ≥ 12 h ($n = 20$). Maternal stress was assessed within three days after birth with the Parental-Stress-Scale:NICU (PSS:NICU) questionnaire measuring three scales: “relationship and parental role”, “sights and sounds”, and “baby looks and behaves”. Maternal socio-demographic data were collected by questionnaire administered at the same time.

Results: Both groups of mothers had similar socio-demographic data. Stress scale of “sights and sounds” was significantly increased in mothers with antepartum stay ≥ 12 h (2.48 ± 0.69) compared to mothers with antepartum stay <12 h (1.95 ± 0.73) ($p = 0.024$). There was no significant difference between the two groups regarding the “looks and behaves” (2.73 ± 0.80 vs. 2.72 ± 0.91 ; $p = 0.962$) and “relationship and parental role” scales (3.31 ± 1.08 vs. 3.58 ± 1.18 ; $p = 0.484$).

Conclusions: Our study demonstrated higher levels of maternal stress after preterm birth in mothers, who had been admitted to hospital for longer periods of time before delivery. Interventional programmes starting in the antepartum period should be established in order to reduce the burden of stress and to improve parental–child interaction.

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Summary of relevance:

Problem or issue

Preterm birth is associated with increased parental stress.

Abbreviations: PSS:NICU, Parental Stressor Scale: Neonatal Intensive Care Unit; TSST, Trier Social Stress Test; PSI, Parenting Stress Index; NICU, Neonatal intensive care unit.

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What is already known

Parents of preterm-born infants are described to experience more stress than parents of term-born children, whereby mothers have more stress than fathers. Furthermore, parental stress is higher with lower gestational ages and birth weights of infants.

What this paper adds

The present study demonstrates that maternal stress after preterm birth is affected by length of antepartum hospital stay. Mothers with longer antepartum hospital stay had higher levels of stress after the birth of preterm infants.

<http://dx.doi.org/10.1016/j.wombi.2016.04.008>

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Please cite this article in press as: Pichler-Stachl E, et al. Maternal stress after preterm birth: Impact of length of antepartum hospital stay. *Women Birth* (2016), <http://dx.doi.org/10.1016/j.wombi.2016.04.008>

1. Introduction

In 2013, an estimated 15 million babies worldwide were born preterm, and this number continues to rise.¹ Many of these preterm infants are cared for in neonatal intensive care units (NICUs), especially extremely preterm infants (<28 weeks of gestation). Prematurely born infants face an increased risk of neonatal mortality. Furthermore, surviving preterm infants experience a reduced quality of life, largely owing to neurodevelopmental impairment, high medical care expenses, rehabilitation and special education. Preterm infants can also develop difficulties in their social competences, especially within peer groups, due to behavioural and cognitive impairment, which is often a critical problem for the child and family unit.^{2–4}

Preterm birth is often associated with increased parental stress, worry, anxiety and loss of control during and after NICU admission.^{5–7} Parental stress has been associated with differences in neurobehavioral development of preterm infants, and parental mental health and family wellbeing are affected by giving birth to a preterm baby.^{8–10}

A recent meta-analysis concluded that parents with preterm infants experience more stress than parents with term infants, with mothers experiencing more stress than fathers.¹⁸ Parental stress is increased with lower gestational ages and birth weight.^{8–10,18} Stress is determined by many factors and not only by prematurity itself. Therefore defining additional parameters and experiences that might further increase stress levels are of increasing interest.

Parents with imminent preterm birth obtain information through their doctors, nurses and midwives, after they are admitted to hospital. The time to obtain information and to become prepared for delivering prematurely varies widely among mothers. Some mothers have no time to become prepared due to acute preterm birth whereas other mothers stay in hospital for up to several weeks before the preterm baby is born.

Different methods have been described to assess psychosocial stress. Stress can be measured by various physiological changes such as heart rate, blood pressure, and cortisol level.¹¹ Alternatively, stress may be measured using instruments with psychometric properties. Widely used and validated questionnaires for assessment of stress are the Trier Social Stress Test (TSST),¹² the Parenting Stress Index (PSI),¹³ and the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU).^{14–17}

The aim of the present study was to evaluate the influence of length of maternal antepartum stay in hospital on maternal stress after birth of a preterm infant with the PSS:NICU questionnaire. We hypothesised, that due to habituation, a longer antepartum stay of the mother in hospital would show reduced stress levels after having given birth to a preterm infant.

2. Participants, ethics and methods

A two-centre prospective pilot observational case-control study was conducted between February and July 2013 at the NICU of the Royal Alexandra Hospital of Edmonton/Canada and from August 2013 to February 2014 at the NICU of the Department of Pediatrics, Medical University of Graz/Austria. The study was approved by the ethics review board of both institutions (Graz: EK-NR: 25-529 ex 12/13, Date of Approval: 21st August 2013; Edmonton: Pro00036344, Date of Approval: 7th February 2013). Written parental informed consent was obtained prior the study.

2.1. Participants

Mothers of preterm infants born at <36 weeks of gestation admitted to the NICUs were included. Only mothers with English proficiency in Edmonton and German proficiency in Graz were

included. Mothers of preterm infants with congenital malformation and or chromosomal anomalies were excluded. Information was collected from data sources including parental questionnaire and accessing hospital charts after the informed consent was obtained. Mothers with antepartum length of hospital stay <12 h, which represents hospitalisation with (sub)acute preterm birth, were compared to mothers with longer antepartum maternal hospitalisation, which was defined as ≥ 12 h. Mothers were matched for the gestational age (+/– one week) of their preterm baby.

2.2. Methods

2.2.1. PSS:NICU (15)

Copies of the PSS:NICU questionnaire were given to mothers (original English version in Edmonton, German (translated) version in Graz) within the first three days after birth of their infant. The questionnaire was completed within the same day. The PSS:NICU questionnaire is designed to measure parental perception of stressors arising from the physical and psychosocial environment of the NICU and measures parental stress in three different scales: “relationship and parental role”, “sights and sounds”, and “baby looks and behaves”.¹⁵

2.2.2. Sociodemographic data of mothers and clinical data of their infants

Maternal sociodemographic data were also collected and the infant’s medical chart was accessed to record time of admission of the mother, time of birth, gestational age, birth weight, gender and any respiratory support (nasal CPAP or mechanical ventilation), haemodynamic treatment (e.g. catecholamines), or cerebral injury (defined as intraventricular haemorrhage of any grade) was recorded, if present.

2.3. Sample size

The study was designed as a pilot study and therefore a convenient sample of 40 mothers in total was used, i.e. 20 matched mothers in each group, would be representative for the target study population.

2.4. Data analyses

Data were anonymised and stored in an excel database (Excel, MS) according to institutional policies.

2.5. Statistics

Differences in baseline characteristics between groups were analysed using a Student *t*-test or Mann–Whitney *U*-test for continuous parametric and non-parametric variables, respectively. To analyse differences in categorical variables Chi square test and, when appropriate, Fisher’s exact test were used. Differences in PSS:NICU between groups and centres were analysed using a Student *t*-test. To analyse associations between continuous variables and scales of PSS:NICU Spearman’s rank correlation (ρ) or Pearson correlation coefficient were calculated for non-parametric and parametric variables, respectively. Statistical analyses were performed using SPSS 22.0 (SPSS, Chicago, IL, USA). Continuous data are presented as median (interquartile range) or mean (SD). Categorical data are presented as absolute and relative frequencies.

3. Results

During the study period 155 preterm infants in Edmonton and 130 in Graz were eligible (Fig. 1). A total of 20 mothers of preterm

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