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POST-TRAUMATIC STRESS DISORDER IN PARENTS OF CHILDREN HOSPITALIZED IN THE NEONATAL INTENSIVE CARE UNIT (NICU): MEDICAL AND DEMOGRAPHIC RISK FACTORS

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SUMMARY

Background: *Post-traumatic stress disorder (PTSD) among parents of neonates hospitalized in the Neonatal Intensive Care Units (NICU) stays an underestimated problem. We determined the incidence of PTSD in parents and pointed out medical and demographic risk factors for PTSD in neonates hospitalized in the NICU.*

Subject and methods: *The study involved 39 mothers and 27 fathers of 42 infants aged 1 to 16 months who were hospitalized in the NICU of a Children's University Hospital during the neonatal period. As a measure of PTSD we used the Polish version of the Impact of Event Scale-Revised (IES-R). The current level of stress was measured using the Perceived Stress Scale (PSS-10). The author's questionnaire contained demographic and medical information on the infants hospitalized in the NICU and their parents. Data were statistically analyzed.*

Results: *The incidence of PTSD and levels of stress did not differ in the group of mothers and fathers. There was a statistically significant difference in the severity of PTSD symptoms in general (p=0.006) and the severity of symptoms of intrusion (p=0.009) and arousal (p=0.015), which were more pronounced in mothers of children hospitalized in the NICU than in their fathers. In the multivariate models perceived stress was the only predictor that significantly affected the rate of PTSD symptoms in parents.*

Conclusions: *Since PTSD is a very common problem in parents of children hospitalized in the NICU and estimating the risk of its occurrence on the basis of collected data is not possible, the parents of all those children should be considered at high risk.*

Key words: *post-traumatic stress disorder (PTSD) - Neonatal Intensive Care Unit (NICU) – neonates - parents*

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INTRODUCTION

Many factors contribute to general stress in parents of infants in the neonatal intensive care unit (NICU). According to Miles et al. (1997) there are four main types of stressors: the appearance and behavior of a sick infant, the use of complex medical language and technology and parents' loss of their role in their infant's care. Dealing with having pre–term or seriously ill baby, parents have reported a variety of reactions including sadness, fear, anxiety, grief, and helplessness (Joseph et al. 2007). While a variety of distressing reactions are normative at this time, significant and prolonged parental distress, including posttraumatic stress disorder (PTSD) are of greater clinical concern (Lefkowitz et al. 2010).

Increased rates of PTSD have been found in parents of children hospitalized in the NICU (Lefkowitz et al. 2010, Shaw et al. 2009) and in the Pediatric Intensive Care Unit (PICU) (Bronner et al. 2010). It has to be emphasized that PTSD observed in parents negatively affects their attitudes to their baby. According to Feeley et al. (2008) mothers with greater symptoms of PTSD were less sensitive and effective at structuring interaction with their infant. Also, Bosquet Enlow et al. (2013) showed that raised maternal PTSD symptoms after 6 months were associated with increased risk for an insecure, particularly disorganized, mother-infant attachment relationship at 13 months of age.

Many authors described feasible and accepted intervention to reduce anxiety and symptoms of traumatization relating to premature birth among parents of very low birth-weight infants (Feeley et al. 2008, Jotzo et al. 2005, Hatters Friedman et al. 2013)

The existing risk factor data for PTSD in parents of infants hospitalized in the NICU are not conclusive. One of the reasons for this situation may be, inter alia, cultural differences and access to professional psychological care. In Poland there were not conducted studies of PTSD in parents of neonates hospitalized in the NICU so far and the emergence of particular risk for PTSD would allow for implementation by nurses and doctors prevention activities in the NICU. The aims of this study were to determine the frequency and the medical and demographic risk factors for PTSD in parents of neonates hospitalized in the NICU.

SUBJECTS AND METHODS

Subjects

The participants included 39 mothers and 27 fathers of 42 infants aged 1 to 16 months who were hospitalized in the NICU of a Children's University Hospital in eastern Poland in the neonatal period. Study exclusion criteria were: the inability to read and write in Polish, lack of consent to participate in the project and taking care of a child by legal guardians who are not the parents. During the phone call with potential respondents there were provided information about the purpose of the study. After obtaining verbal consent for the questionnaire it was sent to the respondents by post. Respondents received a questionnaire, instructions how to fill in the questionnaire, an informed consent form and a feedback envelope addressed with a glued postage stamp (in order to not bear any costs). At home parents completed the questionnaires and returned them by post.

This study is a result of a larger research project which was approved by the Institutional Review Board of Medical University of Lublin (KE-0254/77/2013). The survey was designed in accordance with the ethical principles of the Helsinki Declaration (World Medical Association 2002).

Methods

Impact of Event Scale – Revised (IES-R). As a measure of PTSD we used the Polish version of the Impact of Event Scale – Revised (IES-R) designed by Weiss & Marmar (1997). The IES-R was adapted by Juczyński & Ogińska – Bulik (2009) who demonstrated high reliability and factorial validity of the Polish IES-R. The Cronbach's alpha coefficient was 0.92 for the whole scale. However, for each of its components (Intrusion, Avoidance, and Arousal) it was 0.89, 0.78 and 0.85, respectively (Juczyński & Ogińska – Bulik 2009).

Perceived Stress Scale (PSS-10). The current level of stress was measured using the Perceived Stress Scale (PSS-10) developed by S. Cohen, T. Kamarck i R. Mermelstein. The PSS-10 consists of 10 questions that measure subjective impressions concerning worries and personal experiences, ways of behavior and coping with difficult situations. The overall result of the crude scale ranges from 0 to 40 points - the higher the score, the severity of stress is greater. Raw score can be converted into units of the standard scale stents. Polish adaptation of the scale was made by Juczyński & Ogińska – Bulik (2009). The Cronbach's alpha coefficient ranged from 0.72 to 0.90 (Juczyński & Ogińska – Bulik 2009).

Information Form. Information Form reported on parents' gender, age, habitation, employment, education, number of children, gestational age, Apgar score (1st minute) and health problems of the children. Mothers completed items about their childbirth and pregnancy histories (history of previous pregnancies, miscarriages, pre-term births, hospitalizations and USG in the last pregnancy, infants' medical problems identified during pregnancy and mothers medical problems during the last pregnancy). Data contained in this questionnaire significantly correspond to those included in the regular medical records of the child. They are available for both nurses and doctors working in the NICU, in other hospital wards and specialist clinics and primary health care.

Statistical analyses

The statistical analyses of the collected data were conducted using the computer softwares STATISTICA 10 (StatSoft, Poland) and SPSS 20. The relationship between variables was evaluated using the Chi-square (χ^2) on the independence of the features. When the variables studied were not subjected to normal distribution, to compare two independent groups, the Mann–Whitney U-test was used. In order to assess the impact of demographic and child's health-related factors on the occurrence of PTSD in parents the logistic regression analyzes were performed. To verify the influence of these factors on the severity of PTSD symptoms in parents we used multiple linear regression analysis. Statistical hypotheses were verified at the level of $p<0.05$.

RESULTS

Mothers and fathers of infants hospitalized in the NICU did not significantly differ in terms of demographic and child's health-related factors. The incidence of PTSD and levels of stress did not differ in the group of mothers and fathers, either. However, there was a statistically significant difference in the severity of PTSD symptoms in general (p=0.006) and the severity of symptoms of intrusion (p=0.009) and arousal (p=0.015) which were more pronounced in mothers than in fathers of the studied infants (Table 1).

A positive screening for PTSD was more frequent in parents burdened with chronic diseases (p=0.041), those whose partners suffered from PTSD (p=0.007) and in parents of children diagnosed with nervous system diseases (p=0.044) (Table 2).

Logistic regression analysis was performed when the diagnosis of PTSD in parents was the dependent variable and gender, age, education, child survival, length of hospitalization, positive screening for PTSD in a partner and levels of stress were the independent variables (predictors). Tested regression model explained 32.2% of the variance of the dependent variable (R-square=0.322). Obtained regression coefficients are shown in Table 3. Perceived stress was the only predictor that significantly affected the rate of PTSD symptoms in parents. The influence of other variables proved to be statistically insignificant (Table 3).

Table 1. Sample characteristics

	Variables	Mothers	Fathers	p
Parental characteristics	Parent's age, mean (SD)	31.0 (5.4)	32.8 (4.6)	0.165
	First-born child, n (%)	21 (54%)	13 (50%)	0.761
	Urban residents, n (%)	20 (51%)	13 (48%)	0.802
	Higher education level, n (%)	21 (55%)	12 (46%)	0.474
	Employed under the agreement, n (%)	16 (46%)	14 (64%)	0.187
	Anamnesis of chronic diseases, n (%)	5 (13%)	1 (4%)	0.220
	Positive PTSD Screening[a], n (%)	20 (51%)	9 (33%)	0.149
	Intensity of PTSD symptoms[a], mean (SD)	50.0 (18.3)	39.4 (15.2)	0.006
	Intensity of intrusion[a], mean (SD)	2.69 (1.02)	2.17 (0.89)	0.009
	Intensity of arousal[a], mean (SD)	2.43 (1.01)	1.85 (0.88)	0.015
	Intensity in avoidance[a], mean (SD)	1.30 (0.88)	1.63 (0.71)	0.108
	Positive partner's PTSD Screening[a], n (%)	8 (33.0%)	11 (46%)	0.376
	Current stress level[b], mean (SD)	22.1 (7.5)	20.6 (6.7)	0.391
Infant characteristics	Gestational age (HBD), mean (SD)	34.33 (4.8)	34.2 (5.5)	0.953
	Birth weight (g), mean (SD)	2362 (1050)	2276 (1143)	0.794
	Month of life (completed) at interview, mean (SD)	8.0 (3.0)	8.1 (3.3)	0.908
	APGAR score at 1st minute, mean (SD)	6.3 (2.9)	6.0 (3.1)	0.690
	Stay in NICU (days), mean (SD)	21.2 (25.2)	24.8 (29.2)	0.696
	Cesarean section, n (%)	25 (64%)	20 (74%)	0.392
	Died, n (%)	6 (15%)	4 (15%)	0.949
	Congenital malformations, n (%)	15 (38%)	11 (41%)	0.852
	Genetic malformations, n (%)	2 (5%)	2 (7%)	0.702
	Operations, n (%)	26 (67%)	18 (67%)	1.000
	Cardiovascular diagnoses, n (%)	12 (31%)	11 (41%)	0.403
	Bronchopulmonary diagnoses, n (%)	38 (97%)	27 (100%)	0.401
	Alimentary diagnoses, n (%)	13 (33%)	8 (30%)	0.751
	Neurogical diagnoses, n (%)	10 (26%)	5 (19%)	0.497
	Genitourinary diagnoses, n (%)	6 (15%)	5 (19%)	0.737
	Infections, n (%)	25 (64%)	17 (63%)	0.925
	Asphyxia, n (%)	19 (49%)	13 (48%)	0.964

[a]IES-R- (Impact of Event Scale – Revised); [b]PSS 10 - (Perceived Stress Scale)

A multivariate regression analysis was performed in which the severity of PTSD symptoms in parents was the criterion variable, while gender, age and education of parents and child survival, length of hospitalization, positive screening of PTSD in a partner, and levels of stress, served as predictors. Only perceived stress was strongly and positively associated with the varying severity of PTSD (beta=0.576, $p<0.05$). Other explanatory variables proved to be statistically insignificant. Tested regression model explained 50.8% of the variance in PTSD severity ($R2=0.508$, $p<0.0001$) (Table 4).

DISCUSSION

Our study showed that 33% of the fathers and 51% of the mothers of children hospitalized in the NICU met criteria for PTSD. It is a very high percent, so we searched for the factors that would account for such a high occurrence of PTSD.

The first relevant factor may be the fact, that our NICU does not have a psychological intervention program for parents of premature infants during hospitalization, which, according to Jotzo & Poets (2005), may reduce the severity of symptomatic response to the traumatic impact of premature birth. The others may be related to fact that prior research has showed an increased prevalence of PTSD in Poland in comparison with other countries (Norris et al. 2002). This finding does not have an adequate explanation - a possible cause could be the lack of appropriate institutional support for victims or so-called culture of complaining (Zawadzki 2006, Wojciszke et al. 2001).

The vast majority of publications indicate that women from general population and mothers of children hospitalized in the NICU more frequently suffer from PTSD in comparison with men (Perrin et al. 2013, Youngblut et al. 2013, Lefkowitz et al. 2010). Frequency of PTSD diagnosis in the mothers of children hospitalized in the NICU ranged from 5% to 35% percent, whereas in the fathers it ranged from 8% to 33% (Youngblut et al. 2013, Lefkowitz et al. 2010, Hatters-Friedman et al. 2013). We demonstrated that the difference in the prevalence of PTSD in the mothers and fathers of infants hospitalized in the NICU (51% and 33%, respectively) was not statistically significant. No statistically significant difference may result from a small study group. However, mothers presented with significantly higher total PTSD symptoms and severity of intrusion and arousal symptom clusters.

Table 2. Comparison of parents with positive and negative screening result for PTSD

	Variables		Positive PTSD screening	Negative PTSD screening	p
Parental characteristics	Parent's age, mean (SD)		32.3 (5.5)	31.3 (4.9)	0.442
	Parent, n (%)	Mother	20 (51%)	19 (49%)	0.149
		Father	9 (33%)	18 (67%)	
	First-born child, n (%)		12 (41%)	22 (61%)	0.113
	Urban residents, n (%)		11 (38%)	22 (59%)	0.083
	Higher education level, n (%)		14 (50%)	19 (53%)	0.825
	Employed under the agreement, n (%)		15 (56%)	15 (50%)	0.674
	Anamnesis of chronic diseases, n (%)		5 (17%)	1 (3%)	0.041
	Intensity of PTSD[a], mean (SD)		58 (10.3)	35.9 (16.5)	<0.00001
	Intensity of intrusion[a], mean (SD)		2.9 (0.6)	2.2 (1.1)	0.008
	Intensity of arousal[a], mean (SD)		2.7 (0.7)	1.8 (1.0)	<0.001
	Intensity in avoidance[a], mean (SD)		2.2 (0.5)	0.9 (0.4)	<0.00001
	Positive partner's PTSD Screening[a], n (%)		12 (63%)	7 (24%)	0.007
	Current stress level[b], mean (SD)		23.3 (7.0)	20.0 (7.0)	0.063
	Premature labors history (women), n (%)		12 (48%)	11 (52%)	0.749
	Miscarriages history (women), n (%)		5 (26%)	1 (6%)	0.087
	Hospitalization during pregnancy, (SD)		1.4 (1.4)	1.3 (1.4)	0.770
Infant characteristics	Birth weight (g), mean (SD)		2080 (964)	2521 (1141)	0.129
	Gestational age (HBD), mean (SD)		34.1 (4.7)	34.4 (5.3)	0.062
	Month of life (completed) at interview (months), mean (SD)		8.1 (3.1)	8.1 (3.2)	0.977
	APGAR score at 1st minute, mean (SD)		6.7 (2.6)	5.76 (3.17)	0.206
	Stay in NICU (days), mean (SD)		25.9 (29.6)	20.2 (24.5)	0.091
	Cesarean section, n (%)		22 (76%)	23 (62%)	0.236
	Died, n (%)		4 (14%)	6 (16%)	0.785
	Congenital malformations, n (%)		11 (38%)	15 (41%)	0.830
	Genetic malformations, n (%)		1 (3%)	3 (8%)	0.431
	Operations, n (%)		7 (24%)	15 (41%)	0.160
	Cardiovascular diseases, n (%)		9 (31%)	14 (38%)	0.569
	Bronchopulmonary diseases, n (%)		28 (97%)	37 (100%)	0.255
	Alimentary diseases, n (%)		8 (28%)	13 (35%)	0.513
	Neurogical diseases, n (%)		10 (34%)	5 (14%)	0.044
	Genitourinary diseases, n (%)		4 (14%)	7 (19%)	0.579
	Infections, n (%)		22 (76%)	20 (54%)	0.068
	Asphyxia, n (%)		13 (45%)	19 (51%)	0.598

[a]IES-R- (Impact of Event Scale – Revised); [b]PSS 10(Perceived Stress Scale)

Table 3. The logistic regression model for the dependent variable: positive screening for PTSD

	B	Standard error	Wald	df	Significance	Exp(B)	95% CI for EXP(B)	
							Lower level	Upper level
Constant	9.076	3.616	6.299	1	0.012	0.000		
Female	0.550	0.826	0.443	1	0.505	1.733	0.344	8.738
Age	0.098	0.084	1.385	1	0.239	1.103	0.937	1.300
Higher education	-0.317	0.785	0.164	1	0.686	0.728	0.156	3.390
A partner with PTSD	1.393	0.793	3.089	1	0.079	4.029	0.852	19.054
Perceived stress	0.148	0.062	5.817	1	0.016	1.160	1.028	1.309
Child survival	1.496	1.291	1.343	1	0.246	4.464	0.356	56.026
Length of hospitalization	0.010	0.016	0.381	1	0.537	1.010	0.979	1.042

CI*- Confidence interwal; The model explains 32.2% of the dependent variable, p=0.009.

Table 4. The linear regression model for the dependent variable: intensity of PTSD

Model	Non-standardized coefficients		Standardized coefficients	t	Significance
	B	SE*	Beta		
Constant	-4.739	18.021		-0.263	0.794
Female	5.907	4.235	0.168	1.395	0.171
Age	0.413	0.447	0.112	0.923	0.361
Higher education	2.485	4.126	0.070	0.602	0.550
A partner with PTSD	8.692	4.443	0.241	1.956	0.057
Perceived stress	1.379	0.300	0.576	4.600	0.000
Child survival	-2.021	6.946	-0.043	-0.291	0.773
Length of hospitalization	-0.045	0.088	-0.077	-0.518	0.607

SE*- Standard Error; The model explains 50.8% of the dependent variable, $p<0.0001$

Influence of demographic factors on the occurrence of PTSD in the population of parents of children hospitalized in the NICU is still not well understood. Some authors report statistically significant impacts of several demographic factors while others negate it. Shaban et al. (2012) showed that maternal occupation was related to PTSD following childbirth. In addition, Youngblut et al. (2013) reported that more Hispanic and African-American mothers, compared with those of Caucasian race, suffered from PTSD after their child's death. Different results were presented by Lefkowitz et al. (2010) according to whom there was not a significant association between PTSD and demographic characteristics: parents' age, ethnicity, and level of education. The results of our study also showed no statistically significant effect of demographic data on the prevalence of PTSD in parents of children hospitalized in the NICU.

A review of the literature suggests that positive psychiatric history, exposure to other traumatic events and high levels of anxiety and depression are important predictors of PTSD (Jakovljevic et al. 2012). For example, Lefkowitz et al. (2010) showed that PTSD symptoms severity was associated with concurrent stressors and family history of anxiety and depression. In the population of parents of ill children, the incidence of PTSD was related to the pre-existing psychopathological factors, psycho-social stressors, and trauma exposure (Bronner et al. 2008, 2009, Lefkowitz et al. 2010).

Literature on the influence of prior pregnancy loss (miscarriage, stillbirth, and/or induced abortion) on the risk of postpartum psychiatric disorders shows that women with a history of pregnancy loss are at increased risk for depression and anxiety, as well as PTSD after childbirth (Giannandrea et al. 2013). Our findings, although not statistically significant, suggest that the prevalence of PTSD is higher in women who have previously experienced one or more miscarriages. In our opinion, this lack of statistical significance is probably due to very small size of the study group (miscarriage was related to 6 women, of which 5 patients experienced symptoms of PTSD).

The influence of subjective and objective states of the newborn at birth and later on the incidence of PTSD in parents is also not fully understood, while several studies vary in their conclusions. However, it seems that most of the variables related to the state of the newborn are not associated with a higher incidence of PTSD in the population of parents of children hospitalized in the NICU. Dudek-Shriber (2004) showed that consistent predictors of parental stress were length of stay in the NICU, extreme prematurity and cardiovascular diagnosis of a newborn. Also, Feeley at al. (2011) demonstrated that medical data of a neonate (how ill the infant was during the NICU hospitalization) was related to mothers' PTSD symptoms. Nonetheless, other research has shown that by PTSD in parents was not related to infant's characteristics (e.g., gestational age, birth weight, Apgar scores or length of stay in the NICU) and objective measures of illness/injury severity but rather to prolonged uncertainty, lack of agency, disruptions in meaning systems and alterations in parental role expectations (Lasiuk et al. 2013). Lefkowitz et al. (2010) obtained similar findings: physician- and parent-rated medical severity was not significantly associated with PTSD scores, nor was infant's location at the examination time (home vs. still hospitalized), infant's medical characteristics (diagnosis, whether medical problems were known during pregnancy).

Undoubtedly, a relatively small sample size, selected in a non-randomized manner in the NICU, represents the major limitation of the current study. In addition, future research on this topic should be conducted in several time points, as well as use structured clinical interviews in order to obtain a more valid diagnosis of PTSD.

CONCLUSIONS

Since PTSD is a very common problem in parents of children hospitalized in the NICU and estimating the risk of its occurrence on the basis of collected data is not possible, the parents of all those children should be considered at high risk. Regular screening procedures, conducted by either psychologists or trained nurses, aimed to detect parents suffering from PTSD seem warranted. Implementation and evaluation of an in-hospital ward or standard of education and psychoprophylaxis, taking into account the problems of coping with stress in this population, should be promoted.

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