Relationships between Stress Experienced by Parents of Hospitalized Infants in NICU and the Infants' Characteristics

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Abstract: *This study addressed the relationships between stress experienced by parents of hospitalized infants in neonatal intensive care unit (NICU) and the infants' characteristics. 216 parents of at-risk infants in the NICU of two Teaching Hospitals in the South-East Zone of Nigeria were selected for the study. Two research questions and three null hypotheses guided the study. The respondents completed two questionnaires on NICU Parental Stress Scale. A parent – infant demographic sheet was also used to obtain information about the parent and infant characteristics. Mean score, standard deviation and Spearman Rank correlation coefficient (rho) were used to answer the research questions. Chi-Square test statistics was adopted in testing the null hypotheses at 0.01 level of significance. The infant gestational age and birth weight were observed to be significantly correlated with the stress experienced by the parents over the appearance and behaviour of the NICU infants. Also there were significant differences in parental stress for NICU staff behaviour and communication, the sights and sounds in the NICU as well as NICU infant behaviour and appearance with regard to the infant position in the family.*

Keywords: Infant characteristics, NICU, Parents, Stress

1. Introduction

Medically fragile infants are born into families of all races, religions, nationalities and cultural backgrounds without regard for their social environment (Syder – Greenberg and Dokkin, 2000)[1]. As technology increases, smaller and more medically fragile infants are being treated and kept alive in highly technical neonatal intensive care (NICU) environments (Miles et al, 1993)[2].

From birth, the child has an ability to respond to the environment which influences the interaction between mother and child (Wigert et al, 2006)[3]. In typical circumstances, the parent-infant bonding process that occurs during the newborn period establishes the foundation for a lifelong relationship. However, this typical process does not necessarily occur when the infant is born at risk, and spends the first several weeks or months in the NICU (Case-Smith, 1993)[4]. If this attachment is interrupted, the child's emotional development is negatively influenced (Wigert et al, 2006)[3].

Neonatal Intensive Care Unit (NICU) environment has the potential to exacerbate stress for parents of infants admitted to the unit. NICU stressors, individually or in combination, may interfere with the parent-infant relationship and create extra difficulties for the couple and wider family (Carter et al, 2007)[5].

When parents have an infant in neonatal intensive care, they bring with them their own unique characteristics and set of circumstances. While in the NICU, parents are also influenced by the specific situational conditions of their infants. According to Miles and Carter (1983)[6], these conditions can include the severity of their infant's diagnosis, the infant's appearance and level of functioning, and the duration of their infant's stay in the unit. Environmental factors that can influence parents' unique reaction to having an infant in the NICU might include difficulty in fulfilling their parental role, the medical equipment used for intervention, and the communication patterns and behaviour of the staff (Miles and Carter, 1983[6]; Hunter, 2001[7]). Miles and Carter (1983)[6] explained that as a result of the various factors that can influence the parents, each parent develops his or her own way of cognitively appraising, or making judgments about the NICU experience. For example, some parents, may view their situation as positive since their infant is getting the care he or she needs, others may see it as negative when the infant or staff is unable to correspond to their expectations or needs, some parents may cope by using the environmental resources available to them such is the support of the NICU staff, while others may use personal resources such as family, friends or financial assets. Hence, the response to the stress of having a child in the NICU can therefore be the result of a complicated interaction of various variables that can potentially be adaptive or maladaptive. Increased information about how parents of hospitalized high-risk infants perceive NICU, and also an understanding of the needs of such parents may enable NICU Staff to identify parents at risk and plan interventions to meet those needs and promote family functioning. This is particularly important given evidence that factors such as parental well-being, family cohesion and parent-child relationships make significant contributions to infant longer-term

developmental outcomes (Carlson et al, 2003[8]; Elgar et al, 2004[9]; Martins and Gaffan, 2000[10]). This study was therefore intended to determine how the stress experienced by parents of the infants hospitalized in the NICU relate to the infants' characteristics.

1.1 Research Questions

- What is the relationship between the birth weight of NICU infants and the stress experienced by their parents over the infants' behaviour and appearance?
- To what extent does the gestational age of the infant relate to parental stress for NICU Infant behaviour and appearance?

1.2 Hypotheses

- Significant difference does not exist between the infant position in the family and the stress experienced by parents over the behaviour and communication pattern of the staff in NICU where their infants are hospitalized.
- There is no significant difference between the infant position in the family and parental stress for the Sights and Sounds in the NICU where the infant is hospitalized.
- Significant difference does not exist between the infant position in the family and parental stress over the behaviour and appearance of their hospitalized infants in NICU.

2. Materials and Methods

2.1 Design and Sampling

The study was a correlational research design. A convenient sample of 216 parents (mothers and fathers) of high-risk infants who were hospitalized in the NICU of two Teaching Hospitals in South-East Zone of Nigeria was used for the study.

Ethical approval was obtained for the study and informed consent was obtained from the parents. Inclusion criteria for the study were parents of the preterm babies and neonates with other illnesses (like asphyxia, birth injuries, congenital malformations, Jaundice, etc) that necessitated their admissions into the unit for special care. Parents who indicated not to participate were excluded from the study, and also their infants were not used. The parents were approached at various points within their infants' hospitalization. To obtain data on stress, the researchers approached the parents at a time when they were visiting but not holding their babies, and when not involved with other NICU personnel. Copies of the Questionnaires were administered at that time as well. For their information to be included in the study, their infants had to remain in the NICU for at least 24 hours. Confidentiality was ensured by not including names of the respondents in data collection. Rather code numbers were used instead of names.

2.2 Instrument

Parental Stressor Scale: Neonatal Intensive Unit (PSS-NICU) developed by Miles and Funk (1987)[11] and designed to measure the parents perception of stressors within the NICU was used by the researchers in this study. The scale consists of four sub-scales that measure stress related to sights and sounds (eg presence and noise of monitors and equipment, other sick babies, alarm noises, large number of staff), appearance and behaviour of the infant (eg tubes and equipment on, in or near the infant, infant color, size, cry, movements, labored breathing), the impact on parents' role and their relationship with their baby (eg being separated from their infants, unable to feed and care for the infant, fear of touching or holding the baby, feeling helpless to help the infant), and the parents' relationship and communication with the staff (eg. Staff explaining things too fast, not enough information, staff looking worried about infant or not understanding).

Additional questionnaire items adopted from Abdin's (1995)[12] Parenting Stress Index (PSI) were added to the questionnaire sub-scales of infant behaviour and parental role alteration. For example, items like distractibility/ hyperactivity, nil-adaptability, nil-reinforcement of parents, demandingness, mood and nil-acceptability were added to the questionnaire items of Infant Behaviour subscale, while items like incompetence, isolation and non-attachment were added to the subscale of parental role alteration. The responses to the PSS:NICU were scored on a 5-point Likert scale ranging from 1point for "not at all stressful", 2 points for "mild stress", 3 points for "fairly moderate stress", 4 points for "very stressful" and 5 points for "extreme/ severe stress". Higher scores indicate more stress.

Another instrument (questionnaire) on Parental Self-report Scale on the coping measures parents adopt, alterations in mood (such as sad always, grief, anxiety, depression), concern about infants' outcome, involvement in decision-making as a measure to reduce stress and spouse presence in stress reduction was used for the study. The responses were rated on a 4-point scale ranging from 1 point for not at all, 2 points for fair, 3 points for much and 4 point for very much. Higher scores for this indicate more coping abilities for the parent.

A parent – Infant Demographic sheet was constructed for the study by the researchers to obtain information on the parent and infant characteristics that might contribute to, or be predictive of the different stress responses among the parents. These data were obtained confidentially from the medical files and included information on the parents' gender, age, marital status, ethnicity, education and occupation. Data collected on the infants demography included their gestational age, birth weight, diagnosis and length of stay. Internal consistency reliability coefficients were calculated using cronbach's alpha for the entire scales. 20 parents of hospitalized infants in the NICU of a teaching hospital in another zone in Nigeria were used. The internal consistencies for the entire scales were 0.76 and 0.65 respectively.

3. Data Analysis

Standard descriptive statistics like means, frequency, standard deviation were used to summarize the independent variables and the PSS: NICU total and four subscales. Mean score, standard deviation and spearman Rank coefficient

were used to answer the research questions. Chi square statistical test was used to test the null hypotheses at 0.01 level of significance. SPSS version 21 was used in the data analysis.

4. Result

Table 1: Demographic Characteristics of the Study Population

Variable	Frequency	Percentage
Parental sex:		
• Male	10	4.6
• Female	206	95.4
Parental Marital Status (MS):		
• Married	210	97.2
• Single	6	2.8
Parental Ethnicity:		
• Ibo	183	84.7
• Hausa	7	3.2
• Yoruba	10	4.6
• Ijaw	4	1.9
• Edo	6	2.8
• Tiv	5	2.3
• Langthang	1	0.5
Parental Educational Level:		
• Illiterate	6	2.8
• Primary	30	13.9
• Secondary	121	56.0
• Tertiary	59	27.3
Parental Occupation:		
• Artisan	20	9.3
• Business	146	67.6
• Civil Servant	26	12.0
• Professional	24	11.1
Number of Children:		
• None alive	11	5.1
• Some alive	44	20.4
• All alive	161	74.5
Fertility History of the Parents:		
• Infertile Prior to Child birth	23	10.6
• Fertile Prior to Child Birth	193	89.4
Infant Sex:		
• Male Child	132	61.1
• Female Child	84	38.9
Infant Position:		
• First Child	67	31.0
• Second Child	60	27.8
• Third Child	88	40.7
• Above third Child	1	0.5
Infant Length of stay in Hospital:		
• Few Days	101	46.8
• Long Stay	115	53.2

Total Population N = 216

Demographic characteristics of the study population are shown in table 1.4.6% of the respondents were males while 95.4% were females. The single parents constituted 2.8% while the married ones were 97.2% of the population. Majority of the respondents (84.7%) were Ibos, Hausas were 3.2%, Yoruba 4.6%, Ijaw 1.9%, Edo 2.8%, Tiv 2.3% and Langthang 0.5%. Majority of the respondents (56%) had secondary education while 2.8% were illiterates, 27.3% had tertiary education while 13.9% were of primary school level. 67.6% were business men and women, 12.0% were civil servants, 11.1% were professionals and 9.3% were artisans.

74.5% had all their children alive, 20.4% had some of their children alive while 5.1% had none alive. With regard to the respondents' fertility history, 89.4% were fertile prior to childbirth while 10.6% had fertility treatment prior to childbirth. Among the NICU infants of the respondents, 61.1% were males while 38.9% were females; 31% constituted first child, 27.8% second child, 40.7% third child and 0.5% above third child. For the infants' length of stay in the hospital, 46.8% spent few days while 53.2% spent long period. The respondents' total population was 216.

Table 2: Descriptive Statistics of the Measured Variables

Variable	N	Mean	SD
Parental Age	216	29.9352	5.87509
Number of children born by Parents	216	2.6944	0.56170
Infant Gestational Age	216	35.2130	5.73370
Birth Weight of Infant	216	2.6160	0.97483
PSS for sights and sounds in NICU	216	2.5718	0.81058
PSS for NICU Infant behaviour and Appearance	216	2.9213	0.86783
PSS for NICU Staff Behaviour/Communication	216	2.6139	1.06251
NICU Parental Role Alteration	216	3.0728	1.08000
NICU Parental Self-report coping Measures	216	3.2407	0.51870
Valid N (Listwise)	216		

Table 2 shows the descriptive statistics of the measured variables. Out of the 216 respondents, the mean age was 29.9352 with standard deviation (SD) of 5.87509, mean for number of children born by the respondents (the parents) was 2.6944 with SD of 0.56170, mean value of infant gestational age 35.2130 with SD of 5.73370; mean for the infants' birth weight 2.6160 with SD of 0.97483. Parental stress (PSS) for NICU sights and sounds had mean score of 2.5718 with SD of 0.81058, mean of PSS for NICU infant behaviour and appearance was 2.9213 with SD of 0.86783, mean of PSS for NICU staff behaviour and communication 2.6139 with SD of 1.06251, mean of NICU parental role alteration 3.0728 with SD of 1.08000, while the mean of NICU parental self-report coping measures was 3.2407 with SD of 0.51870.

Table 3: Relationship between Infant birth weight and parental stress for NICU Infant behaviour and Appearance

Variables	N	$\overline{X}$	SD	rho	Critical value	Level of significance
Infant Birth Weight	216	2.6160	0.97483	0.542**	0.000	0.01
PSS for NICU Infant Behaviour and Appearance	216	2.9213	0.86783			

** Correlation is significant at 0.01 level (1-tailed)

Table 3 shows that the rho correlational value for the relationship between infant birth weight and parental stress for NICU infant behaviour and appearance was 0.542. The correlation was significant at 0.01 level.

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Table 4: Relationship between Infant gestational age and parental stress for NICU Infant behaviour and appearance

Variables	N	$\bar{X}$	SD	rho	Critical value	Level of significance
Infant Gestational Age	216	35.2130	5.73370	**0.374	0.000	0.01
PSS for NICU Infant Behaviour and Appearance	216	2.9213	0.86788			

** Correlation is significant at 0.01 level (1-tailed)

Above table 4 shows rho correlational value of 0.374 for the relationship between infant gestational age and parental stress for NICU infant behaviour and appearance with a critical value of 0.000. The correlation was significant at 0.01 level.

Table 5: Chi-Square test comparison of infant position in the family and parental stress for NICU staff behaviour and communication

Infant Position	N	Mean Rank	df	X^2-Cal	X^2-Crit	Probability
First Child	67	97.09	2	3.893	0.143	P<0.01
Second Child	60	118.76				
Third Child and above	88	108.97				
Total	215					

Table 5 shows that X^2-cal of 3.893 was more than X^2-crit of 0.143 at 0.01 level of significance. The null hypothesis is rejected. There is significant difference between infant position in the family and parental stress for NICU staff behaviour and communication.

Table 6: Chi-Square test comparison of Infant position in the family and parental stress for the Sights and Sounds in NICU.

Infant Position	N	Mean Rank	df	X^2-Cal	X^2-Crit	Probability
First Child	67	102.07	2	1.684	0.431	P<0.01
Second Child	60	116.17				
Third Child and above	88	106.94				
Total	215					

Table 6 shows that at 0.01 level of significance, the calculated X^2 of 1.684 was more than the X^2-crit of 0.431. The null hypothesis is rejected. There is significant difference in parental stress for the Sights and Sounds in NICU with regard to the infant position in the family.

Table 7: Chi-Square test comparison of infant position in the family and parental stress for behaviour and appearance of NICU Infants

Infant Position	N	Mean Rank	df	X^2-Cal	X^2-Crit	Probability
First Child	67	96.93	2	3.546	0.170	P<0.01
Second Child	60	108.83				
Third Child and above	88	115.87				
Total	215					

At 0.01 level of significance, the calculated X^2 of 3.546 was more than the X^2-crit of 0.170 (table 7). The null hypothesis is rejected. There is significant difference in parental stress for NICU infant bevahiour and appearance with regard to the infant position in the family.

5. Discussion

Findings from the study indicate significant correlation (rho=0.542) between infant birth weight and parental stress for NICU infant behaviour and appearance (table 3). Valizadeh, Akbarbeglou and Asad (2009)[13] observed that parents of infants hospitalized in NICU experience high stress level as they watched the helplessness of their tiny infants making facial grimaces indicating pain. Singer et al (1999)[14] reported that mothers of high-risk infants with very low birth weight experienced higher stress levels than mothers of low-risk infants of very low birth weight and infants who were typical. The characteristic appearance and behavior of low birth weight infants coupled with the NICU setting where such infants are cared for are unresistable stress-provoking factors for the parents.

The significant correlation (rho=0.374) between infant gestation age and parental stress for NICU infant behavior and appearance (table 4) is in line with the findings of many researchers. Carter, Mulder and Darlow (2007)[5] noted that infant appearance-stress was highest for parents of infants born under 33-weeks gestation. Dudek-Shriber (2004)[15], in her study, found that infant characteristics of gestational age resulted in significantly different stress scores concerning the baby's appearance and behavior. In addition, Dudek – Shriber (2004)[15] noted that extreme prematurely was among the consistent predictors of NICU stress among the parents.

Findings from the study indicate significant difference between infant position in the family and parental stress for NICU staff behavior and communication (table 5). Kalmuss and Davidson (1992[16] stated that transition to parenthood is a major life event with long-term consequences for individuals in families, and perhaps the most important opportunities for discrepancies between expectations of parenthood; and the experiences with child rearing occurs after the birth of the first child. According to Kalmuss and Davidson (1992)[16], experiences that are more negative than expected may be associated with a more difficult adjustment. In a similar manner, finding the first-born in the NICU after child-birth will certainly be agonizing and embarrassing to parents, and the agony will be compounded if the parents perceive the attitude of the NICU staff to be negative and contrary to their expectations.

Findings from the study indicate significant difference in parental stress for the Sight and Sounds in NICU with regard to infant position in the family (table 6). Alfie (2005)[17] stated that the position of a child in the family, whether a firstborn, a middle child, the youngest, an only child, or one within a large family, has some bearing. Buckley (1998)[18] opined that an individual's birth order is a possible influence on the relationships with parents. The implication therefore is that the gravity of stress experienced by the parents over the Sights and Sounds in NICU where their infants are hospitalized varies with the birth order of the hospitalized infant.

Also the study revealed significant difference in parental stress for NICU infant behavior and appearance with regard to infant position in the family (table 7). In studies

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comparing maternal psychological states before and after the birth of a first child, Ounsted and Hendrik (1977)[19] observed that many new mothers were found to be overly anxious, and that ill health of the neonate and difficultly in establishing a routine were implicated. In addition, Ernst and Angst (1983)[20] reported that new mothers generally respond more quickly to the distress of a first child and are slower to respond to the later born children.

6. Conclusions

This study indicated that infant characteristics of birth weight, gestational age and the ordinal position in the family have impact on parental stress over the NICU environment where the infant is hospitalized.

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