

Parental Perception of Neonates, Parental Stress and Education for NICU Parents

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Purpose The purpose of this study was to conduct a comparative analysis between the perception of parents with premature infants in the NICU and parents with full-term newborns, and in the process to evaluate the effects of NICU educational support on parents with regard to their perception of neonate and parental stress.

Methods A mixed quantitative design was employed to compare parental perception of neonates using the Neonatal Perception Index (NPI) between the parents of 26 full-term infants (full-term group) and the parents of 22 premature infants in the NICU (NICU group), and also to evaluate the effect of NICU educational support on NPI and parental stress using the Parental Stress Scale (PSS) between the mothers and fathers in the NICU group.

Results NICU mothers showed the lowest NPI score among full-term and NICU parents. However, no difference in direction of NPI scores was observed between parents in either the full-term or NICU group. NICU education improved NPI and decreased PSS in fathers but not in mothers.

Conclusion Environmental modifications of the nursery setting, particularly its remote location to the NICU, could improve mothers' perception of full-term neonates. NICU mothers, as the principal caregivers, may suffer from culturally-grounded, psychoemotional disturbances after giving birth to a sick infant, which may not be applicable to fathers. The quality of family-centered care in the NICU environment, parental role alteration, and the condition of infants need to be improved to decrease parental stress in the NICU. Fathers may have significant potential in caring for mothers and sick infants during the transition to parenthood. Education for NICU parents should be done for both mothers and fathers in the acute postpartum period. [*Asian Nursing Research* 2007;1(3):199-210]

Key Words education, intensive care units, neonatal, parenting, premature infant, stress

INTRODUCTION

Parents are the most crucial and immediate environment in which the infant survives and develops. During pregnancy, parents develop an anticipatory

set on the images of the child that provides the experiential basis for "knowing" the newborn child (Rubin, 1984). This anticipatory set anchors the parental perception process of the newborn with regard to the objective references: sex, size and shape,

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condition, appearance, and behavior. If there is a discrepancy between parental expectations and the reality of the appearance and behavior of the newborn such as in the case of a preterm baby or one with a congenital malformation, it may impair parental perception of the newborn (Broussard, 1979; Rubin).

Parents of premature infants experience multiple stressors related to preterm birth, the medical condition of the postpartum mother and/or infant, admission of their infant to the neonatal intensive care unit (NICU) and perceived vulnerability of the infant, in addition to stressors associated with the normal transition process to parenthood (Carter, Mulder, Bartram, & Darlow, 2005; Miles & Holditch-Davis, 1997). Clinical practice and research in the NICU have focused on facilitating psychosocial adjustment to parenthood (Kleberg, Hellström-Westas, & Widström, 2007; Ward, 2001). Most research has focused on understanding and improving the mother–infant dyad interaction in the NICU. The conventional maternal role of being a primary caregiver in traditional cultures may be primarily responsible for this phenomenon, while the traditional paternal role is one of being financially responsible for the household (Kabira, Gachukia, & Matiangi, 1997; Landzelius, 2006).

However, modern transitions in family structure and gender roles demand involvement from both parents for the optimal outcomes of their offspring (Bjorklund & Pellegrini, 2000; Nystrom & Ohrling, 2004). These changes are particularly obvious in societies such as Korea, which has undergone modernization with advances in reproductive health. For example, Korea's total fertility rate was 1.08 in 2005 and 1.13 in 2006, compared with 6 in the 1970s, the lowest rate and the fastest decline in the world (Korea National Statistical Office, 2007). In contrast, the rate of low birth weight infants in Korea had risen to 25% of all live births in 2000, compared to 13.6% in the 1980s (Kook, 2007). These statistics exemplify the noticeable cultural transition in the value of offspring and child health, needs for paternal engagement, and demands in remarkable advances in contemporary neonatal practice (Geary, 2000).

Parenting is a culturally-grounded phenomenon. Few reports have focused on the parenting of younger generations in Asian cultures, where women bear the traditional parenting and family roles as the primary caregiver. However, rapid modernization and changes in the value system pose challenges to traditional parenthood roles as young parents experience the transition to parenthood. The importance of fatherhood, both to normal parenting and during the challenge of parenting a child in the NICU, is even much less studied. Fathers of premature infants often confront two major challenges: the unexpected preterm delivery by their spouse and hospitalization of their premature infant in the NICU. Often, fathers are as naïve as (or more so than) mothers about the birth process, parenthood and infant health problems (Rubin, 1984). They are often neglected during the double duty of caring for both their postpartum spouse and offspring in the NICU, while continuing with their patriarchal duties of protecting and financially supporting their family and being ultimately responsible for their family (Nystrom & Ohrling, 2004). The traditional view of manhood may make it difficult for them to ask for help.

Neonatal nurses should understand this cultural background and focus on the psychosocial adaptation of both parents in the normal parenthood process, as well as during the challenging time of having their premature infants in the NICU. Educational intervention in the NICU should recognize the significance of both motherhood and fatherhood, and be purposefully implemented and evaluated for that purpose. However, parent education sessions and supporting services in NICUs are usually offered during the day, when the father may not be available because of work obligations. The perception of fathers and mothers of neonates and parental stress needs to be explored in the context of cultural diversity. Hence, this study was conducted to compare how mothers and fathers perceived their premature infants in the NICU compared to parents of full-term newborns, and evaluated the effects of NICU educational support on parents with regard to their perception of neonates and parental stress levels.

METHODS

The study consisted of two phases: phase 1 was an explorative descriptive study that compared differences in parental perception of neonates between parents of full-term infants and parents of premature infants in a NICU; phase 2 was a quasi-experimental study that investigated the effects of NICU education on parental perception of neonates and parental stress in parents of premature infants (Table 1).

Participants

The study involved 26 mothers and fathers of full-term infants (full-term group), and 22 mothers and fathers of premature infants in the NICU (NICU group) of a university-affiliated hospital. Sample size was calculated based on a mean and standard deviation (SD) of a previously reported Parental Stress Scale (PSS) of NICU parents (Spear, Leef, Epps, & Locke, 2002). A higher level of power, .9, was set due to a moderate alpha level, .1, resulting in 17 parents in the NICU group. The total sample size was increased due to lack of Neonatal Perception Index (NPI) reference data in NICU parents and PSS data at a Korean NICU.

Inclusion criteria for the full-term infant group were singleton newborn, gestational age (GA) ≥ 37 weeks and Apgar score ≥ 7 at 5 minutes after birth. Parents of full-term newborns who experienced prenatal, perinatal or postnatal complications were excluded due to a potential variation in the normal parenthood process. For the NICU group, parents of premature infants were included if their newborns were born before 37 weeks GA and hospitalized in

the NICU for longer than 7 days due to medical conditions. Infants born and transferred from other hospitals were excluded from the study due to uncertain prenatal or perinatal conditions.

Instruments and variables

Parental perception of neonates: Parental perception of their neonate is defined as a degree of how parents identify the sex, size and shape, condition, appearance and behavior of their newborn (Rubin, 1984). To assess parents' perception of their neonate, the NPI developed by Broussard (1979) was used. The NPI consists of 15 items on crying, spitting up, feeding, elimination, sleeping, and settling down to a predictable pattern. The NPI asks parents to rate, on a 5-point Likert scale, how much trouble the "average baby" has compared to their own baby. Differences in total scores between the average baby and their own baby at or below zero imply a negative perception (negative direction), in which the parent perceives their infant to be more difficult than the average baby, which is associated with a high risk of later socioemotional problems in childhood. The direction of the difference in scores, not the difference itself, is a matter of interpretation. A positive difference (positive direction) implies a positive perception of their own infant being less difficult than the average baby, which is associated with a low risk of later socioemotional problems in childhood (Broussard; Palisin, 1981). The reliability of Cronbach's alpha was .77 for average infants and .61 for own infants in a study of Korean parents with infants in the NICU (Lee, 2003), and .71 for average infants and .67 for own infants in this study.

Table 1

Schematic Design of Study with Variables

Participants	Baseline	Intervention	Post-intervention
Parents of full-term infants	NPI*	Not applicable	Not applicable
Parents of premature infants in the NICU	NPI* PSS [†]	NICU education support	NPI [†] PSS [†]

*Phase 1: comparison of NPI in mothers and fathers between full-term infants and premature infants in the NICU; [†]Phase 2: analysis of differences in NPI and PSS before and after NICU education in the parents of premature infants in the NICU. NPI = Neonatal Perception Index; PSS = Parental Stress Scale; NICU = neonatal intensive care unit.

Parental stress: The level of stress among parents of premature infants in the NICU was measured using the Overall Stress (Metric 2) of the PSS developed by Miles, Funk, and Carlson (1993). The original PSS consisted of 26 items in three subscales: parental role alterations, sights and sounds of the unit, and infant behavior and appearance. Each item was rated on a 5-point Likert scale (1–5) as to the degree of perceived stress of the responder. If an item was not perceived as a stressor, it was coded as “0”. The higher the score, the higher the stress level as perceived by parents. It was translated into Korean by the authors and validated by a third professional who is bilingually fluent in both English and Korean with back translation. During translation, one item (“not alone”) was excluded due to ambiguity of meaning, so the Korean PSS consisted of 25 items. The total score ranges from 0 to 125. The Cronbach’s alpha was .95 in this study.

Both the NPI and PSS showed good content validity by being developed by qualified neonatal researchers and by being widely adapted in the assessment of parental adjustment with low- to high-risk infants (Holditch-Davis, Schwartz, Black, & Scher, 2007; Kang, Kim, & Son, 2004; Lee, 2003; Miles, Funk, & Carlson, 1993; Nystrom & Ohrling, 2004).

Intervention of NICU education

NICU education was performed by one of the authors with the assurance of both parents in the NICU group during evenings or on weekends. The content was developed based on the perceived needs of parents in the NICU (Ward, 2001), parenting of premature infants (Miles & Holditch-Davis, 1997), and the clinical experience of the authors with NICU parents. The unit supervisor and nursing staff reviewed and understood the content of the intervention, which included sharing emotion, information on preterm birth and premature infants, the NICU environment and its regulations (i.e., hand washing), care and therapeutic interventions in the NICU, diagnostic examinations (i.e., brain sonogram), technical support and equipment (i.e., pulse oximetry, ventilator), feeding support, hospital charges and social resources, follow-up care, etc. The process

took about 40–50 minutes, including a question-and-answer session for parents.

Data collection

The study was approved by the institutional review board of the study hospital. Informed consent was obtained from all parents with assurance of confidentiality. Parents in both groups were approached the day after delivery in the low-risk nursery or NICU to complete the NPI and PSS questionnaires. NICU education was individually scheduled to include both mothers and fathers within 3–4 days of hospitalization. Post-intervention data were collected after 7–8 days of hospitalization from both mothers and fathers in the NICU group. Blindedness between mothers and fathers was not intended during data collection because interaction between parents is considered an essential part of parenthood. Interaction among NICU families was not controlled for because it is a natural part of parental adjustment in the NICU, although it is less likely.

Data analysis

Using SPSS version 14.0 (SPSS Inc., Chicago, IL, USA), descriptive statistics are presented as mean, *SD*, and frequency with percent (%). Comparison of NPI in both mothers and fathers between the full-term and NICU groups was performed using the independent *t* test. The effect of NICU education was analyzed as the difference in NPI and PSS before and after NICU education using the paired *t* test. The relation between NPI and PSS was analyzed using Pearson’s correlation. Univariate analysis was performed to explore if the demographic characteristics of participants had any effect on study variables. The level of significance was set at $\alpha = .10$ in a two-tailed test due to a relatively small amount of paternal research in Korean NICUs.

RESULTS

Characteristics of participants

The mean age of mothers and fathers was 33 years and 35 years, respectively, in both full-term and

NICU groups. Mean birth weight, mean GA, and Apgar score at 5 minutes were all greater in the full-term group than in the NICU group (Table 2). While there were more cesarean section deliveries in the NICU group, there were no group differences in duration of marriage, birth order of infants, religion of the parent, or planned pregnancy.

Table 3 lists the health problems of the premature infant group for NICU admission. In addition to prematurity, 82% of infants were diagnosed with respiratory distress syndrome, followed by jaundice (55%) and electrolyte imbalance (27%). Premature rupture of membranes and iatrogenic preterm labor accounted for about two thirds of the maternal primary reason for preterm birth.

Comparison of NPI in mothers and fathers in the full-term and NICU groups

The mean NPIs of parents in the full-term and NICU groups are compared as baseline scores in Table 4. Both mothers and fathers in the full-term group showed slightly positive NPI scores (0.91 and 1.74), while the scores were negative in the NICU group (-2.00 and -0.53). There was no difference in NPI scores between mothers and fathers in either the full-term group ($t=-0.76, p=.459$) or the NICU group ($t=0.69, p=.495$), and no group differences in either mothers ($t=1.67, p=.103$) or fathers ($t=1.53, p=.133$).

Since the direction of parental NPI scores is related to risk for later socioemotional problems in

Table 2
Characteristics of Participants

	Full-term group (n = 26) Mean (SD)	NICU group (n = 22) Mean (SD)	t (p)
Age of mothers (years)	33.1 (4.03)	32.7 (4.65)	0.36 (.718)
Age of fathers (years)	34.8 (4.98)	35.0 (4.60)	-0.14 (.892)
Duration of marriage (months)	55.6 (55.74)	54.0 (35.92)	0.42 (.669)
Birth weight of infants (grams)	3031.5 (399.64)	1610.8 (526.26)	10.68 (.000)*
Gestational age of infants (weeks)	38.4 (1.36)	31.5 (0.255)	11.12 (.000)*
Apgar score at 5 minutes	9.0 (0.53)	7.2 (2.46)	3.73 (.001)†
Birth order of infants	1.7 (0.80)	1.4 (0.67)	1.14 (.260)
	n (%)	n (%)	χ^2 (p)
Type of birth			10.77 (.005)†
Vaginal	7 (27)	4 (18)	
Cesarean	19 (73)	18 (82)	
Religion			0.90 (.319)
Yes	10 (38)	12 (55)	
No	15 (58)	10 (45)	
Planned pregnancy			0.99 (.319)
Yes	13 (50)	15 (68)	
No	13 (50)	7 (32)	
Sex of infant			2.03 (.154)
Female	16 (62)	9 (41)	
Male	10 (38)	13 (59)	

* $p < .001$; † $p < .01$.

Table 3

Health Problems in the NICU Group (N = 22)

Premature infants (n = 22)		Mothers (n = 22)	
Problems*	n (%)	Problems†	n (%)
RDS	18 (82)	PROM	7 (32)
Jaundice	12 (55)	Iatrogenic preterm labor	7 (32)
Electrolyte imbalance	6 (27)	Placenta previa	4 (18)
Infection	4 (18)	Pregnancy-induced hypertension	2 (9)
Glucose intolerance	4 (18)	Infection	2 (9)
Apnea	3 (14)	Total	22 (100)
Meconium aspiration	2 (9)		
Asphyxia, IUGR	1 (5), 1 (5)		
Total	51 (233)		

*Multiple responses allowed; †primary medical diagnosis. NICU = neonatal intensive care unit; RDS = respiratory distress syndrome; IUGR = intrauterine growth restriction; PROM = premature rupture of membranes.

Table 4

Comparison of Neonatal Perception Index Scores Between the Full-term and NICU Groups

	Full-term group (n = 26) Mean (SD)	NICU group (n = 22) Mean (SD)	t (p)
Mothers	0.91 (3.49)	-2.00 (7.21)	1.67 (.103)
Fathers	1.74 (3.78)	-0.53 (5.75)	1.53 (.133)
t (p)	-0.764 (.459)	0.689 (.495)	

NICU = neonatal intensive care unit.

childhood (Broussard, 1979), we compared the scores of both mothers and fathers in the full-term and NICU groups. No distributional difference in the direction of NPI scores was observed between parents in either the full-term ($\chi^2=0.18$, $p=.668$) or NICU group ($\chi^2=1.51$, $p=.219$) (Table 5).

The effects of NICU education on NPI and PSS

NPI scores tended to decrease after intervention in mothers (from -2.00 to -4.21) but not in fathers (from -0.53 to -0.50), though the changes were not statistically significant ($t=-1.18$, $p=.257$ in mothers; $t=0.10$, $p=.922$ in fathers; Table 6). After intervention, however, the mean NPI score of fathers was significantly higher than in mothers ($t=-2.713$, $p=.010$).

The mean PSS score was 3.43 in mothers and 3.23 in fathers before intervention ($t=0.98$, $p=.334$). However, the PSS score of fathers significantly decreased to 2.90 after intervention ($t=-2.03$, $p=.056$), with no change in mothers ($t=-0.42$, $p=.678$). Though the interparental difference was still not significant ($t=1.12$, $p=.270$), the PSS score after intervention significantly differed between mothers and fathers ($t=1.76$, $p=.086$). Education did not change NPI and PSS scores based on participant characteristics such as type of delivery, birth order and Apgar score, or infant birth weight and GA.

In the NICU group, the direction of NPI scores changed from positive to negative after the

Table 5

Comparison of Neonatal Perception Index Direction Between the Full-term and NICU Groups

	Full-term group (n = 26)		NICU group (n = 22)	
	Mothers, n (%)	Fathers, n (%)	Mothers, n (%)	Fathers, n (%)
Positive direction	12 (46)	11 (42)	7 (32)	11 (50)
Negative direction	14 (54)	15 (58)	15 (68)	11 (50)
χ^2 (p)	0.18 (.668)		1.51 (.219)	

NICU = neonatal intensive care unit.

Table 6

The Effect of NICU Education on NPI and PSS in the NICU Group (N = 22)

	Pre-intervention Mean (SD)	Post-intervention Mean (SD)	Difference Mean (SD)	t (p)
NPI				
Mothers	-2.00 (7.21)	-4.21 (5.00)	-1.88 (6.37)	-1.18 (.257)
Fathers	-0.53 (5.75)	-0.50 (3.44)	0.18 (7.36)	0.10 (.922)
t (p)	-0.689 (0.495)	-2.713 (0.01)*	-0.854 (0.40)	
PSS				
Mothers	3.43 (0.89)	3.35 (0.81)	-0.07 (0.70)	-0.42 (.678)
Fathers	3.23 (0.65)	2.90 (0.76)	-0.33 (0.72)	-2.03 (.056) [†]
t (p)	0.98 (0.334)	1.76 (0.086) [†]	1.12 (0.270)	

*p < .05; [†]p < .10. NPI = Neonatal Perception Index; PSS = Parental Stress Scale; NICU = neonatal intensive care unit.

Table 7

Comparison of NPI Direction Between Mothers and Fathers in the NICU Group (N = 22)

	Negative changes n (%)	No changes n (%)	Positive changes n (%)
Mothers	4 (18)	16 (73)	2 (9)
Fathers	4 (18)	12 (55)	6 (27)
χ^2 (p)	4.84 (.089)*		

*p < .10. NPI = Neonatal Perception Index; NICU = neonatal intensive care unit.

intervention in 18% of either mothers or fathers (Table 7). Seventy-three percent of mothers and 55% of fathers showed no change in the direction of NPI scores after intervention, regardless of whether the baseline scores were negative or positive before intervention. More fathers had their NPI score changed from negative to positive

before and after intervention than did mothers (27% vs. 9%).

In mothers, no relationship was identified between NPI and PSS either before ($r = .02, p = .929$) or after the intervention ($r = -.28, p = .240$) (Table 8). However, fathers showed a negative relationship between NPI and PSS before the intervention

Table 8

Relationship Between NPI and PSS Before and After NICU Education (N = 22)

	Pre-intervention <i>r</i> (<i>p</i>)	Post-intervention <i>r</i> (<i>p</i>)
Mothers	.02 (.929)	-.28 (.240)
Fathers	-.41 (.084)*	-.26 (.276)

**p* < .10. NPI = Neonatal Perception Index; PSS = Parental Stress Scale; NICU = neonatal intensive care unit.

($r = -.41, p = .084$) but no relationship after the intervention ($r = -.26, p = .276$).

DISCUSSION

NPI in mothers and fathers in the full-term and NICU groups

Most parents of NICU infants experience a discrepancy between pre-birth expectations and post-birth realities, including the medical condition of the mother and infant(s), separation from infants, an overwhelming NICU environment, and so on. Parental symptomatology is related to infant prematurity, as well as the stress of having an infant in the NICU (Carter, Mulder, Bartram, & Darlow, 2005). This study compared the parental perception of infants in the NICU with that of full-term infants, and also examined the effects of NICU educational support on parental responses to perception of neonates and stress levels.

Parents of premature infants in the NICU tended to have a negative perception of their infants compared with parents of full-term infants. In general, mothers tended to perceive their infants more negatively than fathers (Table 4). One study reported a mean of -0.57 NPI in Korean NICU mothers (Lee, 2003), while another reported a mean NPI of 0.26 in mothers of full-term infants (Kang, Kim, & Son, 2004). Here, the full-term group mothers showed the best NPI scores (0.91), with NICU mothers showing the worst mean NPI score (-2.00), consistent with previous work on the

negative perceptions of NICU mothers (Broussard, 1979).

More than half of mothers had a negative perception regardless of their infant's condition (Table 5). Previous studies of primiparas with full-term infants have reported that 30–50% of Korean mothers have a negative perception of their neonate (no NPI scores presented) (Lee & Park, 1997) compared to 23–39% of US mothers (Palisin, 1980). Here, the proportion of negative NPI in full-term mothers was slightly higher (54%) than in other studies. One reason may be related to the proximity of the low-risk nursery to the level III NICU where full-term infants were located, which could increase parental stress or anxiety regardless of infant condition, and indicates the importance of the hospital environment.

Little has been reported on fathers' perception of their neonates. Parental concerns with their infants include mothers being satisfied, confident, and primarily responsible as a mother; and fathers being confident as a father and a partner, and living up to the new demands (Nystrom & Ohrling, 2004). For preterm infants, mothers preferred to have more responsibility and control in the care of their infants to be confirmed as mothers, while fathers were confident in leaving the care of their baby to hospital staff and finding a balance between work and family life (Jackson, Ternstedt, & Schollin, 2003). Fathers seemed to be concerned about both their partner and the infant, whereas mothers focused on the infant first and foremost. Their infant's condition did not dramatically affect the fathers' perception of their neonate, potentially due to their divided concerns towards their partner and child. Also, it was the mother who had carried the baby for a certain period of time. These mothers had already developed some level of bonding with their infants. This phenomenon would not occur in NICU mothers whose primary concern is the sick infants. It suggests that fathers can better support mothers and infants in the NICU. Fathers may actually be a better candidate for supportive NICU education with mothers or even prior to mothers, particularly when mothers are recovering from

complicated preterm labor and unable to be involved in active parenting.

Mothers of premature infants who are admitted to the NICU are more susceptible to poor adjustment, anxiety, hostility and depression than their spouse (Carter, Mulder, Bartram, & Darlow, 2005; Doering, Dracup, & Moser, 1999; Miles & Holditch-Davis, 1997), which indicates the necessity of early supportive intervention for NICU mothers. However, paternal engagement in the NICU is also important (Spear, Leef, Epps, & Locke, 2002; Ward, 2001). The finding in NPI scores of NICU parents indicates that fathers can actively engage in caring for mothers and sick infants although they are somehow vulnerable to negative perception of newborn infants, and NICU educational support should be available for both fathers and mothers.

The effects of NICU education on parental perception of neonates and parental stress

Here, we required the presence of both mothers and fathers during NICU education. This was challenging because most fathers were at work in the daytime when the routine education was offered, and child caring is not valued as a primary fatherhood role in traditional Asian cultures. Furthermore, when there are limited resources related to childcare such as financial instability, the traditional role of the father is to be the breadwinner and head of the household, and when the condition of the child is such that it demands a great investment from the parents, such as prematurity, it might be the father who has to more often confront the uncomfortable decisions associated with parental investment in the treatment of the sick infant, particularly as seen in many patriarchal societies of Asia (Barrett, Dunbar, & Lycett, 2005; Landzelius, 2006). Fathers may be uncomfortable with attending parent education sessions, confronting reality, and sharing their concerns and desires to be a parent and supporter of the mother. Thus, efforts to include fathers in the education process would be worthwhile.

Fathers' perception of their neonates did not change with intervention, while the mothers' perception actually worsened (Table 6). Perception of neonates should not necessarily increase as time goes on. With the stability of paternal NPI, more positive changes in the fathers' perception of their neonates (27%) than mothers (9%) suggests that NICU education prevented fathers from forming a negative perception of their neonate compared to mothers. PSS also significantly decreased in fathers after education, but did not change in mothers (Table 6). The correlation between NPI and PSS in fathers before but not after intervention suggests that education disconnected the psychological interaction between the two variables (Table 8). These data indicate the advantages of NICU education in reducing fathers' negative perception of neonates and parental stress in fathers. Neonatal clinicians should understand modern changes in parenthood in Asian cultures, and work to appreciate fathers as the primary caregiver for mothers and infants and target their participation in NICU education.

NICU education did not seem to benefit mothers. Studies in Western cultures indicate the benefits of early or long-term intervention for mothers and their premature infants (Kleberg, Hellström-Westas, & Widström, 2007; Melnyk, Feinstein, & Fairbanks, 2006), as summarized by the National Institute of Nursing Research (2005). However, this study suggests that acute maternal experience with preterm birth and sick infants may be complicated, particularly in cultural contexts with different expectations of parenting roles. In any case, the difference in the results of intervention in mothers and fathers could be explained in two ways: a persisting primary role of childbearing and rearing in women, and the cultural transition on paternal engagement with having a sick baby. First, Korea is still a patriarchal culture where childbearing and rearing is a woman's responsibility (Bjorklund & Pellegrini, 2000; Kabira, Gachukia, & Matiangi, 1997). Mothers with complicated pregnancies or abnormal reproductive outcomes often suffer from psychoemotional disturbances such as guilt, self-hate, depression and

loneliness (Baker & Quinkert, 1983; Rubin, 1984). That may explain why mothers did not have improved NPI or PSS scores after supportive education. It may also take more time for the effectiveness of the intervention to become apparent.

On the other hand, paternal improvement in perception of neonate and parental stress could be explained by modernization and cultural transitions of parenthood. The total fertility rate in Korea (1.08 in 2005) suggests that both parents tend to significantly invest in one offspring according to the theory of parental investment (Trivers, 1974). Among the 22 couples in the NICU group, 16 infants were first children. The increased expectations from only having one child could increase parental stress when that child is in the NICU. Also, as nuclear families leave the extended family, there may be less support from the previous generation to engage in the care of the mother and sick infant.

We also found greater parental stress levels compared to studies in other cultures. The mean PSS score of mothers in this study (3.43) was higher than the mean of mothers in the United States (2.24) and mothers in the United Kingdom (2.44), with similar trends for fathers (3.23 in Korea *vs.* 2.24 in the US or 2.17 in the UK) (Franck, Cox, Allen, & Winter, 2005). Parents in the US had a mean PSS score of 2.63 (Miles, Funk, & Carlson, 1993), and other Korean studies reported NICU PSS scores in the range of 3.44 to 3.60 in mothers (Kim, 2000; Sung, 2002) and 3.50 in fathers (Sung, Ahn, & Jang, 2004). The stressors in Korean parents themselves may not differ, and may include infant behavior and appearance, parental role alteration, and sights and sounds (Kim; Sung; Sung, Ahn, & Jang). This higher degree of parental stress calls for improved family-centered care in the NICU, particularly related to NICU environments, parental role alteration, and infant conditions.

This study had several limitations with regard to the interpretation of study results. First, this study did not explore any possible effects of the conditions or characteristics of infants which may affect the parenthood process in the context of parental-infant

interaction. A study with a larger sample size from the NICU may allow further investigation on parenthood variation of low-risk to high-risk newborns. In addition, the level of statistical significance in this study ($\alpha = .10$) calls for additional caution on the interpretation of the study results though it was reasonable to be adapted due to lack of paternal research in Korean NICUs. More study on the parenting process in NICUs, including fatherhood, may guide to the application of a popular level of significance such as $\alpha = .05$.

CONCLUSION

This study compared the parental perception of neonates between parents of full-term infants and those of premature infants in the NICU, and examined the effects of NICU educational support on perception of neonates and parental stress level between mothers and fathers. Mothers of NICU infants had the most negative perception of their neonate. Environmental modification of the nursery setting, and particularly its remote location to the NICU, could improve the perception of neonate of full-term group mothers. Fathers' perception of their neonates was not influenced by the infant's medical condition, suggesting that fathers should receive early NICU education with mothers.

NICU education with both parents improved perception of neonates and parental stress levels in fathers but not in mothers. Mothers might not readily express the changes in perception of their neonates and stress levels during the acute postpartum period, possibly due to greater expectations of their parenting role and responsibility as well as having more feelings of being overwhelmed and guilt. Quality of family-centered care, particularly in relation to the NICU environment, parental role alteration, and the condition of infants, can still be improved. In conclusion, the improvement in paternal perception of neonates suggests that fathers can actively engage in caring for mothers and sick infants more readily than in the past. Further study

is needed to compare motherhood and fatherhood and to provide culturally-sensitive training and support in medical environments.

ACKNOWLEDGMENTS

This work was supported by an Inha University Research Grant.

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