

Parent–Infant Attachment in Infants with Respiratory Assist Devices Hospitalized in Intensive Care Units: A Descriptive Cross-Sectional Study

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Abstract

Background: Hospitalization of an infant in an intensive care unit may disrupt the normal process of parent-infant attachment. This study aimed to evaluate the quality of attachment and determine its related factors in parents of infants with respiratory assist devices.

Methods: This correlational descriptive study was conducted with 180 parents of infants with respiratory assist devices hospitalized in Mofid Children Hospital in Tehran, Iran. The data gathering instrument consisted of a demographic questionnaire and the Parent-Infant Attachment Questionnaire. The data was analyzed through SPSS version 22.

Results: The total score of attachment was 57.43+ and among the dimensions of the attachment questionnaire, the quality of attachment had the highest score. Also in parental and infant demographic variables, the previous history of hospitalization, father's age, and unit type were significantly correlated with attachment score. Moreover, regression results revealed that parent–pediatric attachment score of parents of infants admitted to the pediatric intensive care unit is 1.97 units less than that of the parents whose infants were admitted to NICU. And with the increase in father's age, the rate of the parent–pediatric attachment to the child decreases by 0.19 and the history of the previous hospitalization leads to an increase in attachment to the infant by 3.76 units.

Conclusion: Although the overall score of attachment in the parents of pediatrics dependent on the respiratory devices in the present study was undesirable, but the respiratory assisted device did not affect the parent-pediatric attachment score. Therefore, further studies are recommended to more accurately determine the relevant factors of the parent-pediatric attachment.

Key Words: Attachment, Infants, NICU, Parents, PICU, Respiratory assist device, Ventilation.

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1- INTRODUCTION

In recent decades, advances of technology and science in pediatric and neonatal medicine and nursing have caused a dramatic decline in the infant mortality rate. Exogenous surfactant production, promotion of infant nutrition, and providing developmental care in NICUs were some of the main reasons (1). According to the literature, increasing progress in equipment development for newborns, and the emergence of the new generation of respiratory-assisted ventilation methods are the most influential factors. Respiratory ventilation with assisted devices is the movement of air into and out of the lungs using an external device. The method may be invasive (ventilation through endotracheal tube, laryngeal mask airway, nasal prongs, or tracheostomy) or non-invasive (through the hood, nasal/oral/face mask) (1, 2). Depending on the respiratory situation, assisted device ventilation may last for weeks or months. The aims of respiratory assisted device respiration include: facilitating alveolar ventilation, removal of carbon dioxide, reduction of respiratory distress, or provision of adequate tissue oxygen (1, 3). Infants in need of respiratory assisted devices fall into one of the following categories: those who are severely underweight or premature, infants with severe and fatal abnormalities, infants with brain damage due to asphyxia, or intraventricular hemorrhage (IVH) (1, 4). Using respiratory assisted devices in infants can also be associated with complications, including bronchopulmonary dysplasia (BPD) (5). From the nursing point of view, another aspect of the consequences of assisted ventilation in infants is that it disrupts the parent-infant attachment process (6, 7).

Attachment is defined as the state or quality of emotional connection between parent and infant that begins in the prenatal period, increases with the

sensation of foetus movements, and intensifies after birth with the interaction between infant and parent (8). Attachment is a process which continues throughout the first year of life and beyond (9). It is a special relationship between infant and parent that leads to a sense of safety, security, and protection in the infant. Attachment is where the infants use the parent as a safe nest from which they can confidently explore the environment and return back to it when necessary to feel comfortable (10, 11). The attachment process is a complex phenomenon and its quality largely depends on the parent's responses to the infant during the times of distress or, in other words, when the child needs to feel safe (10, 12). One of the situations that activate the parent-infant attachment is illness and hospitalization. The situation becomes more critical if the infant is admitted to the intensive care unit (9, 12). Research shows that hospitalization in the intensive care unit affects the parent-infant attachment process. One of the main reasons is the lack of enough and effective parental interaction with the infant (13, 14).

Recently, there has been a considerable number of evidence that describe parents' attitudes toward the intensive care unit and the reasons for their disturbing interaction with their infants (14, 15). The majority of parents describe the infant's hospitalization experience as frightening and threatening. The environment, devices and wires connected to the infant, the sound of medical equipment, the infant's appearance, uncertainty about the infant's survival, fear of the future consequences for the infant, and the inability of parents to care for the infant all reduce the interaction between parent and infant (16, 17). While technological advances have improved infants' survival, this succession often depends on lengthy periods of hospitalization and prolonged separation from parents (18).

Because secure attachment requires touching and caring for the infant, the infant's hospitalization in the intensive care unit and, in particular, the presence of respiratory assist devices are important barriers to the parent-infant interaction. Evidence suggests that this may influence the process of parent-infant attachment in both parents (19).

In Iran, several studies have been conducted on the quality, barriers and facilitators of parent-infant attachment in intensive care units (20-25). According to the researcher's knowledge, most of these studies have been done on mothers. Also, most of the studies have been conducted in NICUs which means only parents of infants in their first 28 days life were the studied populations. Several studies also were performed to assess the impact of interventions such as kangaroo care on attachment (20, 26-31), and no study specifically examines the role of respiratory assisted devices as a variable influencing the parent-infant attachment. Identifying the factors affecting secure attachment as much as possible provides nurses with the knowledge to improve the quality of care for infants in such a way that a secure attachment is formed despite the existing restrictive conditions. Therefore, this study aimed to assess parent-infant attachment and its related factors in both parents of the infants with respiratory assisted devices hospitalised in paediatric or neonatal intensive care units in the Mofid Childrens Hospital in Tehran.

2-Methods

2-1. Design and setting

This descriptive cross-sectional study was conducted on parents of infants hospitalised in PICU and NICU of Mofid Children's Hospital. This hospital is one of the three main educational specialized paediatric hospitals in Tehran.

2-2. Sample

The inclusion criteria for the participants were (a) being the biologic parent of the infant (aged between 0-12 months old) (b) not having mental or physical health problem based on self-reports (c) having an infant hospitalised in PICU or NICU who is under respiratory assisted ventilation for at least one week. Transferring infant to another ward, incomplete questionnaire and death of infant were exclusion criteria.

Based on the literature review, the required sample size at 95% confidence level and the maximum estimation error of 0.05, and according to Ergul Aslan et al., in 2017, and the opinion of the Statistics Consultant, 180 samples were considered for this study (9), using the below formula.

$$n \geq \left[\frac{(z_{1-\alpha/2} + z_{1-\beta})}{0.5 \times \ln[(1+r)/(1-r)]} \right]^2 + 3$$

2-3. Measurements

The research instrument consists of 1) Demographic information questionnaire including questions about infant characteristics (age, gender, duration of hospitalization, birth rank) and parent characteristics (age, gender, residence, economic status, job, number of children, and insurance), and 2) "Parent-to-infant Attachment Questionnaire (PAQ)". This questionnaire was developed by Condon to assess the parents' emotional response in relation to the infant, especially in the first year of life (32). It consists of 19 items organized into three subscales: quality of the attachment (QA) with 9 item, refers to a sense of confidence and satisfaction in being a parent, Absence of hostility (AH) with 5 item, refers to the lack of resentment and negative feelings such as hostility or irritation towards the child and Pleasure in interaction (PI) with 5 item, refers to the desire for proximity and interaction with the child and is made up of items which measure the desire to

spend time with the infant, sadness at separation and feelings of pleasure while being with the child. The scale is scored based on 5-point Likerts from 1 (low attachment) to 5 (high attachment). The range of scores is 19 to 95. Higher scores indicate highr attachments. There is no cut-off point of the scale (33-35).

The instrument was translated into Persian by Arshadi Bostanabad et al. and its psychometric properties were determined. In their study, the content validity of the Persian version of PAQ was examined quantitatively using two coefficients of content validity ratio (CVR) and content validity index (CVI). The content validity ratio of the questionnaire was 0.80. The content validity index was also obtained for the criterion of the simplicity of 0.93, for the criterion of specificity of 0.95, and for the criterion of clarity of 0.93, which indicates the adequacy of the content of the Persian version of the attachment questionnaire. Its reliability was confirmed through the Cronbach alpha coefficient as $\alpha = 0.86$ (26).

2-4. Procedure

After obtaining the necessary permits to enter Mofid Children’s Hospital, the first researcher identified the parents with the inclusion criteria; by visiting the neonatal and pediatric intensive care units every day. She explained the aim of the study to the eligible parents, and if they wished to participate in the study, they were given written consent forms to sign. The

researcher collected the data using the face-to-face interview method in a private room. She read each question, and explained when not understood by the participants, and then noted the responses of the parents. The average time for completing the questionnaire was 10-15 minutes. Sampling was continued for three months until the sample size was sufficient.

2-5. Data analysis

Analysing the data was conducted using the SPSS statistical software (version 22.0; SPSS Inc., Chicago, IL, USA). The demographic characteristics of the participants were analysed using descriptive statistics. As the variables had a normal distribution according to the results of Kolmogorov-Smirnov test, to compare the means of the dependant variable between groups, independent t-test and ANOVA were used. In addition, to find any correlation between the variables, all statistical results were considered statistically significant at p-values below 0.05.

2-6. Ethical considerations

This study was ethically approved by the research ethics committee of Shahid Beheshti University of Medical Sciences (IR.SBMU.PHARMACY.REC.1399.337). All the parents received information about the aims of the research. They were given information about the voluntarily participation in the study and confidentiality of their data.

Table-1: Frequency distribution of the studied infants and parents based on their demographic characteristics

Variables		number	%	
children	Gender	Male	122	31.7
		Female	57	68.3
	Setting	PICU	81	55
		NICU	99	45
The type of dependency	Mechanical ventilation through	75	41.7	

		ETE	10	5.6
		CPAP	27	15
		Nasal O2	12	6.7
		Hood	15	8.3
	Mechanical ventilation through tracheostomy	Oxygen through incubator	29	16.1
		Oxygen mask	9	5
		Others	3	1.7
	Previous hospitalization history	Yes	63	35
		No	117	65
	Previous history of chronic disease	Yes	38	21.1
		No	142	78.9
	Number of siblings	Nothing	61	33.9
		One	82	45.6
		Two	32	17.8
Three		5	2.8	
Parents	Gender	Male (father)	101	56.1
		Female (mother)	79	43.9
	Father's employment status	Employed	169	93.9
		Unemployed	11	6.1
	Mothers' employment status	Employed	119	66.1
		Unemployed	61	23.9
	Economic status of family	Not good	38	21.1
		Not bad, not good	101	56.1
		Good	41	22.8
	Frequency of parents' visit	Daily	88	48.9
		Every other day	78	42.3
Three times a week		14	7.8	

Table-2: Frequency distribution of the scores of Parent-infant attachment and its dimensions

Attachment	Mean
The quality of attachment	25.89 (3.30)
Absent of hostility	11.35 (2.60)
Pleasure in interaction	18.67 (4.58)
Total	57.43

Table-3: Differences between the means of attachment score based on variables

Group	Variable	Mean \pm SD	r	p-Value	
children	Gender of infant	Male	58.62(7.21)	1.69*	0.091
		Female	56.88(5.96)		
	Gender of parent	Male	56.65(5.60)	1.69*	0.091
		Female	58.42(7.25)		
	Setting	PICU	55.60(6.13)	3.58*	<0.001***
		NICU	58.93(6.28)		
	The type of dependency Ventilation through	CPAP	57.56(6.24)	0.985	0.459
		Nasal O2	56.56(6.12)		
Hood		56.25(5.91)			

ETE	Ventilation through	Ventilation through	54.92(4.03)		
		tracheostomy	57.22(9.75)		
		Oxygen through incubator	57.74(6.41)		
		Oxygen mask	54.81(4.31)		
		Other	57.73(5.36)		
	Previous history of chronic disease	Yes	59.12(5.76)	-1.84*	0.068
		No	56.98(6.52)		
	Previous hospitalization history	Yes	60.33(5.82)	-0.47*	<0.001****
		No	55.86(6.19)		
	Number of siblings	Nothing	56.28(6.20)	1.67**	0.176
One		58.53(6.72)			
Two		56.66(5.24)			
Three		58.30(9.33)			
Father’s employment status	Employed	57.29(6.51)	1.16*	0.246	
	Unemployed	59.61(4.18)			
Mother’s employment status	Employed	56.96(6.28)	1.36*	0.176	
	Unemployed	58.33(6.63)			
Economic status of family	Not good	55.63(5.58)	1.958	0.144	
	Not bad, not good	59.01(6.48)			
	Good	57.65(6.81)			
Frequency of parents’ visit	Daily	58.17(5.65)	1.527	0.220	
	Every other day	56.97(6.37)			
	Three times a week	55.35(4.51)			
Correlation coefficient between parent-to-infant attachment and some of variables					
Variables			r****	P-value	
Gender of parent			Female	-0.14	0.055
			Male	-0.23	0.002****
Duration of hospitalization			0.089	0.237	

*Independent T-test, **One-way ANOVA, *** significant, ****Pearson correlation coefficient

Table-4: Relationships between the total score of parent–infant attachment and the kind of respiratory assisted device

kind of respiratory assisted device	Attachment mean scores	standard deviation	F-test	P-value
Mechanical ventilation	57.56	6.34	0.965	0.459
CPAP	56.56	6.12		
Nasal O2	56.28	5.91		
Oxyhood	54.93	4.03		
Tracheostomy	57.33	9.75		
Oxygen in incubator Space	57.74	6.41		
Oxygen mask	54.81	4.31		
Others	57.73	5.36		

Table-5: Linear regression between the predictor and dependent variables

Predictor variables	Standardized Coefficient (Beta)	P-value	Lower band	Upper band
Setting of hospitalization	-1.97	0.038	-1.68	1.20
Father's age	-0.19	0.047	-0.039	0.003
Previous history of hospitalization	3.76	0.001	1.53	5.99

3- RESULTS

Data of 180 parents and their infants were analyzed, and none of the filled-out questionnaires was excluded. The majority of infants (68.3%) were males. The respiratory assisted device in 41.7% of infants was mechanical ventilation through endotracheal tube. 55% of the infants were hospitalized in NICU, and the average number of the days of hospitalization was 13.68 days. According to the findings, 21.1% of the infants had a history of previous hospitalization, and 21.1% had a history of a chronic disease. Also, 33.9% of the infants were the single children of their parents.

According to the results, the mean ages of the fathers and mothers were 35.36 (6.98) and 29.94 (5.09), respectively. Most of the parents were fathers (56.1%). 93.9% of the fathers and 66.1% of the mothers were employed. The majority of families had a moderate economic status (56.1%) and 48.9% visited their child in a daily routine. **Table 1** shows the demographic characteristics of children and parents.

The mean total score of parent-infant attachment was 57.43 (6.23) (Table 2). Kolmogorov-Smirnov test indicates that the parent-infant attachment follows a normal distribution, $D(180) = 0.05$, $p = 0.200$. Therefore, according to the confirmation of the hypothesis of parametric tests, independent t-test, and ANOVA were used to compare means. Pearson correlation coefficient, and multiple linear regressions were used for checking the correlations.

As **Table 3** shows, results of the independence t-test revealed a significant difference between the parents' mean score of PAQ based on the previous history of infant hospitalization and the type of setting (NICU or PICU) ($P < 0.001$). One-way ANOVA results showed no significant difference between the parents' mean score of PAQ based on the multiple-groups independent variables.

Pearson correlation coefficient showed a significant indirect relationship between the overall score of parent-infant attachment and the father's age ($p=0.002$, $r=-0.23$).

According to the one-way ANOVA test, there is no significant relationship between parent –pediatric attachment total score and the kind of respiratory assisted device ($P\text{-value}>0.05$) (**Table 4**).

Multiple linear regression analysis was used to exit the effects of potential confounding variables. Accordingly, the variables of setting (NICU or PICU), a previous history of hospitalization and father's age were significantly correlated. According to the results, the total score of the PAQ in parents whose infant is hospitalized in PICU is 1.97 units less than the same score in parents of infants hospitalized in NICU. Also, with the increase in father's age, his total score of PAQ 0.19% decreases; moreover, the previous history of hospitalization, leads to 3.76% increase in PAQ total score (**Table 5**).

4- DISCUSSION

The main aim of this study is to evaluate the quality of parent-infant attachment and its related factors in parents of an infant with a respiratory assist device. Regarding the specific goal of the present study, the results showed that the mean total score of parental attachment to the respiratory-dependent infant was 57.43 that seems to indicate a low attachment between the parents and their pediatrics.

Similar to the results of the present study, Dezvaree et al., in 2016, in Tehran (Iran), reported the mean attachment score of mother-newborn in mothers of hospitalized preterm neonates as 56.59 (36). Given that most preterm infants are probably dependent on respiratory devices, and all of them are in NICUs, these two studies can be similar, and the attachment scores are also very close to each other.

However, the mean overall score of parent-infant attachment in several studies was reported higher than 70, indicating fine attachments, according to the authors (37, 38). Of course, in all the mentioned studies, the demographic characteristics of children were different from those in the present study, and also all studies were performed in conditions other than the Covid 19 pandemic. In addition, methodological issues, such as using different instruments to measure parent-infant attachment, can be one of the causes of this discrepancy.

Therefore, it should be noted that concept analysis of parent-infant attachment, in other words, the physical and psychological experience of approaching the infant, is one of the main features of parent-infant attachment. This feature consists of dimensions including contact, emotional state, and individualization. It means that touching, hugging, looking at the baby's face, talking to, and taking care

of the infant are requirements for strengthening the attachment between parent and infant. Being with an infant is an emotional experience for the parent that deepens over time. Also, through this reciprocal interaction, parents realize the unique characteristics of their infant and begin to acknowledge a separate identity for their child (39).

Another finding of present study was that there is no significant correlation between attachments mean score and parental gender, father's job condition, mother's job condition, mothers age, economic status of the family and the presence of a parent in the hospital with the child.

In line with the results of the present study, Ergul Aslan et al., in 2017, in Turkey, entitled "Fathers' Attachment Status to participation in infant care", found no significant relationship between the attachment scores and father's education level, working status, economic status, duration of the marriage, family size, body mass index and spouses' occupation and education level (9).

Furthermore, our study results agreed with Shoghi et al., in 2018, investigating the effects of massage by mothers on mother-infant attachment. They did not find any statistically significant difference regarding the mother's age, the mother's education, the father's education, the mother's job, or the father's job (22). Similarly, Dezvaree et al., in 2016, demonstrated that mother's job, number of abortions, previous birth history, stillbirth, recent delivery, and number of children were not significantly associated with the attachment score (36).

On the other hand, some studies in this field showed that fathers' education has a significant impact on attachment between pediatrics and fathers (40). Teufi et al., 2019, also reported that the mothers' modes of conversation were associated with the mother-child attachment; the

father-child conversations were not so but instead were associated with the father's educational background (41). For those fathers, less education, as well as lower development scores, were associated with lower attachment scores (42).

The result of the Pearson Correlation test showed that with the increase in father age, the total score of parent-pediatric attachment decreases significantly. Also, the regression results showed that in line with the increase in father's age, the rate of the parent-pediatric attachment decreases by 0.19. In the same line, Reisz et al., in 2019, in a "research entitled Fathers' attachment representations and infant feeding practices" found that the father's age correlated with father feeding behaviors (40). It is also important to note that cultural differences may also play a role in interpreting the results.

Furthermore, our results revealed that there is no significant relationship between the number of siblings, kind of respiratory assisted device, infant's gender and infant's chronic disease history. But there is a significant relationship between the type of unit of infant (PICU/NICU) and the previous history of infant hospitalization. This is in contrast to the results of Dezvaree et al, 2016, reporting that attachment is significantly correlated with neonate gender, desired pregnancy, and desired neonate gender (36). Similarly, Reisz et al, in 2019, found a significant difference across the fathers in the sample based on child sex, such that all fathers were more controlling with their sons than their daughters regardless of attachment. This difference was not present for feeding conflict (40). Moreover, Ruiz et al. reported that the male gender of the child was associated with lower attachment on the part of the fathers (42).

It is noteworthy that in the present study, the infant's gender was not related to the total attachment score. However, the researcher believes that due to cultural

conditions, the child's gender in different cultures may affect the parent-child relationship, but some parents avoid expressing the effect of the child's gender on their relationship with the child in self-report questionnaires. In addition to the parent-pediatric attachment there seems to be differences in different countries and cultures in regard to a child's gender and attachment to fathers. This reveals the need for further studies with larger sample sizes.

Again, contrary to the results of the present study, within a multigroup analysis of parents with children born preterm and at term more secure attachment was found for both parents in the term sample than in the preterm group. Child development proved to be a significant predictor for father-child attachment regardless of the child's birth status (42). However, in the present study, more attachment was observed between parents and children admitted to the NICUs ward, some of whom were also preterm (42).

5- CONCLUSION

Although the overall score of attachment in the parents of pediatrics dependent on the respiratory devices in the present study was undesirable, but the respiratory assisted device did not affect the parent-pediatric attachment score, even though they create less physical distance and less parent-child contact.

From the authors' point of view, one of the possible reasons for the lower level of attachment in the present study is the double decrease of parent-infant interaction due to the restrictions imposed on the presence of people and physical contact in hospital wards during the COVID_19 pandemic. In the setting of this study, the presence of fathers in NICU and PICU was severely restricted, and during the sampling period, many parents and even healthcare providers were very cautious about people contacting infants

due to little information about the COVID-19 and its consequences for infants. Cultural reasons can also play a significant role in this regard. It is suggested that a systematic review or meta-synthesis study be conducted to provide more comprehensive knowledge on the factors affecting parent-infant attachment in the intensive care unit.

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