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## CHAPTER I

### **Prevention of Skin and Nasal Injuries Due to Noninvasive Mechanical Ventilation in Neonates**

**Dilara CENGİZ<sup>1</sup>**  
**Dilek KÜÇÜK ALEMDAR<sup>2</sup>**

#### **INTRODUCTION**

The World Health Organization reports that approximately 13.4 million babies were born prematurely in 2020. Preterm birth complications are the leading cause of death in children under 5 years of age and were responsible for nearly 900,000 deaths in 2019 (Perin et al., 2022: 106-115). In recent years, advances in medicine and technology have increased the chances of survival of preterm infants (Milligan et al., 2017: 89-98; Sweet et al., 2019: 432-450; Duyka et al., 2021: 2658-2663). However, morbidity rates as well as

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mortality rates are high in premature infants due to incompletely developed organs and systems. Failure to complete intrauterine development in these babies leads to serious problems such as respiratory problems, endocrine problems such as hypohyperglycemia, nutritional disorders, hypothermia due to lack of adequate thermoregulation, infection, jaundice, congenital anomaly, asphyxia, hypocalcemia, which require intensive care (Çalışır and Güler, 2017: 227-232; Milligan et al, 2017: 89-98; Sweet et al., 2019: 432-450; Duyka et al., 2021: 2658-2663; Machado et al., 2021: 150-155). Respiratory distress is the main cause of neonatal deaths, especially in premature infants, and conditions that require intensive care (Çalışır and Güler, 2017: 227-232). Premature infants are more prone to respiratory system diseases than term newborns due to their anatomical and physiological differences. The incomplete development of both the central and central nervous system causes significant problems in respiratory control and lung function (Sweet et al., 2019: 432-450; Duyka et al., 2021: 2658-2663; Machado et al., 2021: 150-155). Respiratory Distress Syndrome (RDS), Neonatal Transient Tachypnea (NTT), Neonatal pneumonia, Bronchopulmonary Dysplasia (BPD), and pulmonary hemorrhages are the most common causes of respiratory distress in premature infants (Koç et al., 2019: 1-12; Ramaswamy et al., 2021: 3-20; Sweet et al., 2023: 3-23). Due to these causes, signs of respiratory distress such as nasal wing breathing, tachypnea, tachycardia, moaning, substernal, subcostal or intercostal retraction, cyanosis, apnea and dyspnea may be observed in premature infants (Sweet et al., 2019: 432-450; Duyka et al., 2021: 2658-2663).

Mechanical ventilation (MV) support is an important and effective treatment method in the treatment of respiratory distress in newborns (Van Kaam et al., 2021). Mechanical ventilation applications can be performed using invasive and noninvasive methods (Özkan et al., 2018: 45-54; Özer et al., 2021: 24-30). Currently, noninvasive mechanical ventilation (NIMV) methods are more frequently preferred to prevent ventilation-induced lung injury and reduce the risk of bronchopulmonary dysplasia (Milligan et al., 2017: 89-98; Alessi, 2018: 199-207; Sweet et al., 2019: 432-450; Duyka et al., 2021: 2658-2663; Subramaniam et al., 2023: 2-12). NIMV is a mechanical ventilation method applied through an oxygen hood, binasal prong, nasal mask or nasopharyngeal tube without intubation to patients with adequate spontaneous breathing or considered relatively stable (Sweet et al., 2019: 432-450). The main purpose of using NIMV in premature infants is to delay invasive mechanical ventilation and prevent intubation by applying it at the earliest postnatal period (Sweet et al., 2019: 432-450; Okur et al., 2021: 317-322.; Lee et al., 2022: 1-6). Binasal prongs-nasal cannulas are tubular interfaces made of soft plastic and terminated with two prongs that can be inserted into both nostrils. It is the most preferred NIMV method in NICUs because it is easy to use and economical (Özek and Bilgen, 2018: 112-118; Ribeiro et al., 2021: 1-5; Glaser and Wright, 2021: 235-243). However, prolonged use of cannulas, constant pressure due to tight fixation, improper nursing care, and the sensitive skin structure of the newborn can lead to serious complications on the nose and face (Ribeiro et al, 2021: 1-5; Rezaei et al, 2021: 1-6; Ngaisah et al, 2021: 190-196; Magalhaes et al, 2022: 247-254; Biazus et al, 2023: 1-6; Mohamed et al, 2023:

592-598; Gautam et al, 2023: 2645-2654; Wu et al, 2024: 33-38; Ergün and Aktaş 2024: 1-7; Fu et al, 2024: 224). Skin injury during NIMV was observed in 60-80% and nasal injury in 68% (Boyar, 2020: 111-116; Queensland Clinical Guideline, 2018; Raurell-Torreda et al. 2017: 31-41). The globally reported incidence of nasal injury varies between 20% and 60% (Boyar, 2020: 111-116; Dai et al., 2020: 26-31; Mohamed et al., 2023: 592-598; Gautam et al., 2023: 2645-2654; Ergün and Aktaş, 2024: 1-7). As the gestational age of infants decreases, the risk of device-related injury increases (Duyka et al., 2021: 2658-2663). In low birth weight infants, nasal injury often develops in the septum in the first 48-72 hours (Ota et al, 2013: 245-250; Xie, 2014: 218). Nasal injury in newborns can cause many problems ranging from short-term problems such as increased pain and stress, deterioration in comfort, especially the risk of infection, to functional and cosmetic deformities of the nose and vestibule that may require surgical intervention (Sweet et al., 2019: 432-450; Milligan et al., 2017: 89-98).

## **1. Noninvasive Mechanical Ventilation**

It is a mechanical ventilation method applied through an oxygen hood, nasal cannula, nasal mask or nasopharyngeal tube without intubation to patients with adequate spontaneous breathing or considered relatively stable (Sweet et al., 2019: 432-450). It has been observed that NIMV started at the earliest period during labor reduces the need for IMV by creating functional residual capacity (Okur et al., 2021: 317-322.; Lee et al., 2022: 1-6). In addition, it has been observed that invasive positive pressure ventilation and exposure to high oxygen levels contribute to BPD, one of the long-term complications of IMV; studies have shown that early NIMV

support in premature infants provides a decrease in the incidence of BPD (Subramaniam et al., 2023: 2-23). In the postnatal period, apnea of prematurity, RDS, aspiration syndromes, BPD, TTN, pneumonia, pneumothorax, pulmonary hemorrhage and edema, laryngo-tracheomalacia and post-extubation transition are other conditions that require NIMV. NIMV application methods are as follows:

### **1.1. Nasal Continuous Positive Airway Pressure (NCPAP)**

It is the application of a constant positive pressure above atmospheric pressure to the airway during inspiration and expiration in an infant with spontaneous breathing (Dewez et al., 2018: 1-8; Behnke et al., 2019: 177-183; Al-Lawama et al., 2019: 25-30; Ribeiro et al., 2021: 1-5). It was first used in 1971 in neonates diagnosed with RDS (Al-Lawama et al., 2019: 25-30). It can be applied with different interfaces such as nasal mask, single cannula and binasal prongs (Ribeiro et al., 2021: 1-5). The constant pressure applied during CPAP helps to reduce upper airway obstruction and reduces upper airway resistance. This increases ventilation by improving collapsed alveoli and increasing the surface area required for gas exchange. It also preserves air in the lung at the end of expiration, preventing lung deflation and reducing respiratory workload.

Large randomized controlled trials and their systematic reviews and meta-analyses recommend the routine use of nasal CPAP to minimize lung injury and reduce the likelihood of BPD in premature infants (Subramaniam et al., 2016: 1-15; Isayama et al., 2016: 611-624; Wright et al., 2016: 17-24). It is frequently used in neonatal intensive care units both as primary respiratory support and following weaning from IMV. Other indications for CPAP include



delivery room resuscitation, apnea, laryngo-tracheomalacia or other conditions leading to airway closure, NICU, pulmonary edema, meconium aspiration syndrome and patent ductus arteriosus (Dewez et al., 2018: 1-8; Behnke et al., 2019: 177-183; Al-Lawama et al., 2019: 25-30). However, CPAP application is considered contraindicated in cases of upper respiratory tract abnormalities such as choanal atresia, cleft palate and tracheal esophageal fistula, cardiovascular problems, frequent apnea episodes accompanied by bradycardia and desaturation, diaphragmatic hernia, and respiratory distress findings and apnea persisting despite CPAP application (Ribeiro et al., 2021: 1-5; Glaser and Wright, 2021: 235-243).

Although the use of NCPAP is known to reduce the need for IMV by approximately 50%, it is insufficient in some cases (Behnke et al., 2019: 177-183). Nasal Synchronized Intermittent Mechanical Ventilation (NSIMV), Nasal Intermittent Positive Pressure Ventilation (NIPPV) and Heated Humidified High Flow Nasal Cannulas (HHHFNC), which also provide forced ventilation between spontaneous breaths, are used to delay or prevent IMV when NCPAP is inadequate (Behnke et al., 2019: 177-183; Ribeiro et al., 2021: 1-5; Glaser and Wright, 2021: 235-243).

## **1.2 Interfaces Used in CPAP Therapy**

Nasal masks are small soft masks that can be used in alternating or continuous flow systems. They can be considered as an alternative, especially in infants with nasal septum injury, but they are more difficult to place, require tighter fixation and may cause compression of the nasal arch. When not placed correctly, it causes leaks and loss of pressure during ventilation. The infant's exposure to pressure during expiration increases respiratory workload and the

inability to evacuate air through the mouth increases gastric distension. In addition to its negative effects, positive effects such as significantly reducing the risk of nasal CPAP failure, the need for IMV, the risk of nasal trauma, the incidence of BPD, and surfactant use have been observed (King et al., 2019: 100-114; Sharma et al., 2021: 1890-1896).

Single cannula is applied by shortening the endotracheal tube, advancing it through a single nostril and fixing it in the pharynx. The tube is advanced by measuring the distance between the tip of the nose and the tragus in front of the ear, the part of the tube outside the nose is connected to the ventilator and CPAP is applied. During the application, the tip of the endotracheal tube may injure the pharynx and cause bleeding and obstruction. Secretions may adhere to the posterior pharynx and may not be cleaned by aspiration and prevent CPAP from being performed effectively. In addition, it is not preferred very often because it creates high airway resistance (Özek & Bilgen, 2018: 112-118; Glaser & Wright, 2021: 235-243).

Binasal prongs-nasal cannulas are tubular interfaces made of soft plastic and terminated with two prongs that can be inserted into both nostrils. It is the most preferred CPAP method in NICUs because it is easy to use and economical (Özek and Bilgen, 2018: 112-118; Ribeiro et al., 2021: 1-5; Glaser and Wright, 2021: 235-243). Compared to other interfaces, it creates less airway resistance and is effective in preventing reintubation (Ribeiro et al., 2021: 1-5). There are cannulas of different sizes to adapt to the nostrils of the baby. In order to ensure effective CPAP application, it is important to choose the appropriate size cannula for the baby. It is appropriate for the prongs to cover the baby's nostrils by 2/3 (King et al., 2019:

100-114; Sharma et al., 2021: 1890-1896). Cannulas selected in small sizes cause air leakage and pressure loss, while cannulas in large sizes cause nasal deformities. Excessive pressure and tight fixation of the cannula during insertion and follow-up may cause pressure ulcers in the nasal septum and even septum loss (Sharma et al., 2021: 890-1896).

### **1.3. Skin and Nasal Injuries Due to Noninvasive Mechanical Ventilation**

Nasal CPAP is the most commonly used NIMV method accepted as the gold standard in neonatal respiratory distress. Binasal prongs are the most preferred interfaces because they are lightweight, economical, easy to transport and use, and effective CPAP management. However, prolonged use of cannulas, constant pressure due to tight fixation, improper nursing care, and the sensitive skin structure of the newborn can lead to serious complications on the nose and face (Ribeiro et al, 2021: 1-5; Rezaei et al, 2021: 1-6; Ngaisah et al, 2021: 190-196; Magalhaes et al, 2022: 247-254; Biazus et al, 2023: 1-6; Mohamed et al, 2023: 592-598; Gautam et al, 2023: 2645-2654; Wu et al, 2024: 33-38; Ergün and Aktaş 2024: 1-7; Fu et al, 2024: 224).

Neonatal skin is one of the least developed organ systems at birth (Pascual and Wielenga, 2023: 477-481; Fu et al., 2024: 224). The stratum corneum, the main protective barrier of the skin, is 10-20 times thicker than adult skin. In a 30-week premature, it is only 2-3 layers, and less or absent in younger weeks. Without protection of the stratum corneum, infants are at greater risk of infection, transepidermal water loss, temperature instability and toxicity from antiseptic cleansers (Badr, 2016: 228-233; Grosvenor, 2017: 122-

125; Imbulana et al., 2018: 29-35; Boyar, 2020: 111-116; Biazus et al., 2023: 1-6; Pascual and Wielenga, 2023: 477-481; Fu et al., 2024: 224). In addition, other differences in preterm skin, such as fewer connecting fibers between the epidermis and dermis, less subcutaneous fat, a thinner dermis, and a flattened epidermal junction, also increase the risk of neonatal skin injury. Therefore, premature and low birth weight infants are more prone to skin injuries due to the thin and immature stratum corneum of the epidermis (Imbulana et al., 2018: 29-35; Boyar, 2020: 111-116; Pascual and Wielenga, 2023: 477-481; Fu et al., 2024: 224).

Although newborns are not yet physiologically ready, they are exposed to many therapeutic interventions and medical devices from the moment they are admitted to the neonatal unit (Kara and Arıkan, 2020: 15-21; Magalhaes et al., 2022: 247-254; Biazus et al., 2023: 1-6; Mohamed et al., 2023: 592-598; Gautam et al., 2023: 2645-2654; Wu et al., 2024: 33-38; Ergün and Aktaş 2024: 1-7). A medical device-related pressure injury may occur when there is localized skin or underlying tissue damage in response to external pressure, friction or tearing forces that persist long enough to exceed the skin's tolerance during the use of devices used for diagnostic or therapeutic purposes, resulting in the development of localized poor blood flow (Erbay et al, 2019: 1-7; Kara and Arıkan, 2020: 15-21; Ribeiro et al, 2021: 1-5; Rezaei et al, 2021: 1-6; Magalhaes et al, 2022: 247-254; Biazus et al, 2023: 1-6; Mohamed et al, 2023: 592-598; Gautam et al, 2023: 2645-2654; Wu et al, 2024: 33-38; Ergün and Aktaş 2024: 1-7; Fu et al, 2024: 224). Unstable pressure reduces blood flow to the area and causes blockage of blood and lymphatic vessels, leading to cell hypoxia, tissue necrosis and ulcer formation (Erbay et al,

2019: 1-7; Rezaei et al, 2021: 1-6; Magalhaes et al, 2022: 247-254; Biazus et al, 2023: 1-6; Mohamed et al, 2023: 592-598; Gautam et al, 2023: 2645-2654; Wu et al, 2024: 33-38; Ergün and Aktaş 2024: 1-7). Prevalence rates of up to 23% have been reported for pressure injuries in neonatal intensive care units, 50% of which are caused by friction of medical devices and equipment (Baharestani and Ratliff, 2007: 208-220; Grosvenor and Maura Dowling 2017: 122-125). The most common pressure injuries are nasal injuries resulting from nasal CPAP use. The globally reported incidence of nasal injuries varies between 20% and 60% (Boyar, 2020: 111-116; Dai et al., 2020: 26-31; Mohamed et al., 2023: 592-598; Gautam et al., 2023: 2645-2654; Ergün and Aktaş, 2024: 1-7).

Although CPAP has been used since the 70s, nasal injuries caused by nasal prongs were registered only in 2009 and classified as adverse events in 2010 (Diblasi, 2009: 1209-1235; Fischer et al., 2010: 447-451). Since this damage has become a priority with the increasing use of nasal prongs in neonatal units, it is very important to detect and prevent nasal injuries. Nasal injuries can start with simple hyperemia in and around the nose and result in edema, ulceration and complete columellar necrosis. Nasal injuries are primarily classified as stage I (hyperemia), then they can progress to stage II (superficial ulceration) and progress to stage III, which is characterized by nasal tissue necrosis and loss of entire nasal tissue (Dai et al., 2020: 26-31; Magalhaes et al., 2022: 247-254). It leads to short- and long-term complications such as pain, excoriation, infection, decreased compliance and tolerance to treatment, and the need for intubation to provide time for nasal septum healing in a newborn with a nasal injury (Dai et al., 2020: 26-31; Ribeiro et al.,

2021: 1-5; Rezaei et al., 2021: 1-6; Ngaisah et al., 2021: 190-196; Magalhaes et al., 2022: 247-254; Biazus et al., 2023: 1-6; Mohamed et al., 2023: 592-598; Gautam et al., 2023: 2645-2654; Wu et al., 2024: 33-38; Ergün and Aktaş 2024: 1-7; Fu et al., 2024: 224). In severe cases, irreversible nasal injuries such as nasal vestibular stenosis, nasal deformity, nasal granuloma are observed, and nasal tissue damage requiring plastic surgery may occur (Dai et al., 2020: 26-31; Rezaei et al., 2021: 1-6; Ngaisah et al., 2021: 190-196). This condition causes negative health consequences in the baby, as well as negative aesthetic appearance due to skin loss and necrosis, as well as resource wastage and cost increase with prolongation of the treatment process (Dai et al., 2020: 26-31; Ribeiro et al., 2021: 1-5; Rezaei et al., 2021: 1-6; Ngaisah et al., 2021: 190-196; Magalhaes et al., 2022: 247-254; Biazus et al., 2023: 1-6; Mohamed et al., 2023: 592-598; Ergün and Aktaş 2024: 1-7). Nursing care is the focus during the prevention, identification, treatment and care of nasal injuries. For this reason, nursing care is very important during CPAP administration.

#### **1.4. Nursing Care in Nasal CPAP**

The care of newborns who are hospitalized in the neonatal intensive care unit and need mechanical ventilation support requires knowledge and intensive labor. Neonatal nurses play a major role in directing the care and treatment of the baby due to their constant contact with the baby and more frequent observation (Özkeçeci and Karagöl, 2021: 73-79). In particular, close monitoring of newborns receiving NIMV support in terms of vital signs, respiratory, cardiovascular, gastrointestinal and other systemic signs based on the principle of minimum contact and maximum observation ensures

both prevention of IMV and termination of the need for mechanical ventilation as soon as possible (Ribeiro et al., 2021: 1-5; Özkeçeci and Karagöl, 2021: 73-79). The basic principles in nursing care of newborns receiving NCPAP support are as follows.

- A good nursing care starts with a detailed medical history. The factors that may cause respiratory distress are determined by taking the prenatal and postnatal history of the baby. In the anamnesis, the gestational age of the baby, postnatal age, birth weight, mode of delivery, apgar score and mother's pregnancy history are questioned (Özkeçeci and Karagöl, 2021: 73-79).
- Every baby admitted to the unit is subjected to a physical examination from head to toe upon hospitalization. On physical examination, visible systemic findings and congenital anomalies are recorded. Atresia checks are performed and the presence of congenital anomalies that may lead to respiratory distress is questioned.
- The baby is evaluated for signs of respiratory distress such as tachypnea, withdrawal, nasal wing respiration and apnea. The severity of respiratory distress and the type of mechanical ventilation needed are determined (Ribeiro et al., 2021: 1-5).
- The baby is monitored and vital signs are evaluated and recorded at intervals of 2-3 hours during the first four days and 3-4 hours Dec Dec in the following days

(Ribeiro et al., 2021:1-5; Özkeçeci and Karagöl, 2021: 73-79).

- By taking blood gas, objective findings such as acid-base balance and CO<sub>2</sub> level related to respiratory distress are evaluated. Mechanical ventilator settings are made so that the oxygen saturation is between 88-94% (Ribeiro et al., 2021:1-5; Subramaniam, 2023:2-23).
- Suitable sizes of hats are selected by measuring the baby's head circumference. The fact that the hat is loose makes it difficult to fix the prong, which can increase the damage to the nose due to prong movements. The narrowness of the hat can increase the pressure and lead to pressure sores on the head and ears. During the placement of the hat, care should be taken not to curl the ears under the hat and control should be provided for every position change (King et al., 2019: 100-114; Özkeçeci and Karagöl, 2021: 73-79).
- Suitable interface for baby (mask, prong, single cannula, etc.) are elected. Choosing an interface of the appropriate size for the baby's weight is important to prevent complications such as nasal injury, necrosis and bleeding (King et al., 2019: 100-114; Ribeiro et al., 2021:1-5; Özkeçeci and Karagöl, 2021: 73-79; Subramaniam, 2023:2-23).



- The preferred interface should be fixed to the baby's face in such a way that it is not too tight or loose and should be checked frequently. Tight fitting of binasal prongs and applying pressure leads to nasal septum injuries. There should be a gap of about 2 mm between the nasal septum and the cannula, protective barriers should be used to prevent direct contact of the cannula with the nose and reduce pressure (King et al. Dec., 2019: 100-114; Ribeiro et al., 2021:1-5; Subramaniam, 2023:2-23).
- A large-diameter orogastric probe (OGS) is inserted (8 French) to decompress the air going to the stomach and intestines. Apart from feeding, an injector with the mandyrin removed is inserted at the end of the OGS and placed at a higher point than the baby, open to atmospheric pressure, thus preventing abdominal distension (Ribeiro et al., 2021:1-5; Özkeçeci and Karagöl, 2021: 73-79).
- Application of dry and cold air may cause irritation of the airways, necrosis, decreased ciliary activity and hypothermia. For this reason, the air-oxygen mixture given to the baby must be heated and humidified. Studies conducted suggest that the air supplied should be close to normal body temperature (37C°) and humidity above 75% for the continuity of normal ciliary activity. In newborns ventilated with dry air, the viscosity of bronchial secretions increases, lung compliance and functional residual capacity decrease,

the risk of intrapulmonary shunt and atelectasis is higher. In cases where the inspired air is heated too much, burns may occur in the respiratory tract (Ribeiro et al., 2021:1-5; Özkeçeci and Karagöl, 2021: 73-79).

- Condensation should be prevented in the circuits during heating and humidification. The humidified air condenses in the respiratory circuit, leading to the formation of water drops. This accumulation can lead to aspiration and hypoxia in the baby. If possible, circuits that do not lead to condensation and have water collector jars in them should be preferred (Özkeçeci and Karagöl, 2021:73-79).
- The presence of cannulas in the nose and the application of humidified air may cause an increase in secretions. Although routine aspiration is not recommended in a newborn, aspiration should be performed as often as the signs of respiratory distress increase and the baby's clinical condition requires. The aspiration process should be started from the mouth, then the nose and pharynx should be aspirated. During aspiration, the aspirator pressure should be done gently without exceeding the pressure of 80-100 mmHg. Aggressive aspiration can lead to apnea, bradycardia, irritation of the nasopharynx, bleeding and infection (Özkeçeci and Karagöl, 2021: 73-79).
- The patient should be closely monitored for inappropriate CPAP complications such as sudden

clinical deterioration, desaturation, bradycardia, hypotension and decreased urine output (Subramaniam, 2023: 2-23; Massa-Buck et al., 2023: 975-981).

- Positioning and regular position change are physiologically and neurologically important in infants on mechanical ventilation. Babies who lie in the same position for a long time may experience deformities in the head structure, pressure sores, decreased blood circulation in the lungs, lung dysfunctions due to fluid accumulation in the alveoli. For this reason, the position to be given also affects the respiratory physiology. The prone position increases the baby's oxygenation, tidal volume and lung compliance compared to other positions, reduces energy consumption. Lateral positioning has no effect on respiratory functions, but it has been reported that lateral positioning of the affected side to stay on top in infants with atelectasis will benefit for opening the atelectatic area. In addition, raising the head after feeding, lying in the right lateral or prone position facilitates gastric emptying, reduces gastroesophageal reflux and pressure on the diaphragm. By maintaining the midline position of the head, it should be ensured that the baby lies down in such a way that he feels comfortable in flexion and can change his position. The position of the baby should be changed every 2-3 hours (the field is frequent in babies with circulatory

disorders and a high risk of pressure sores), pressure points should be evaluated and supported with each position change (Jabraeili et al., 2018: 6861-6871; Çakıcı and Mutlu, 2020: 1-8; Altay, 2021: 143-151; Özkeçeci and Karagöl, 2021: 73-79).

- Newborns are exposed to many stimuli that cause pain and stress during mechanical ventilation, such as the insertion of CPAP cannulas, aspiration, blood collection, vascular opening in order to monitor vital signs and correct their physiological condition. It should be remembered that the signs of respiratory distress will increase in cases of pain and stress, and regular pain monitoring should be performed. In infants with a high pain score, pain relief and stress reduction should be provided by non-pharmacological and pharmacological methods (Ribeiro et al., 2021: 1-5; Akkoca et al., 2023: 629-638).
- The family should be informed about the procedures performed, and family-centered and atraumatic care should be provided by involving them if possible (Özkeçeci and Karagöl, 2021: 73-79).
- All procedures performed, vital signs and clinical condition of the baby should be recorded in the nurse observation form.

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## CHAPTER II

### **Supporting Breastfeeding in Preterm Infants Hospitalized in the Neonatal Intensive Care Unit (NICU)**

**Özlem ÇAKCI<sup>1</sup>  
Dilek KÜÇÜK ALEMDAR<sup>2</sup>**

#### **Introduction**

The World Health Organisation (WHO) defines premature babies as babies born before 36 6/7 weeks of gestation (WHO, 2023). The preterm birth rate is approximately 11% worldwide, which means a total of 13.4 million preterm births per year (Ohuma et al, 2023). This rate is equivalent to approximately 1 in 10 babies being born preterm worldwide (Sabaz, 2024). Despite all comprehensive

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efforts to prevent premature birth, according to the latest data of WHO and United Nations Children's Fund (UNICEF), premature birth rates have remained almost unchanged in the last decade (9.8% in 2010 and 9.9% in 2020) and even increased in some regions (Ohuma et al., 2023). It is seen that the preterm birth rate in our country has followed a similar course over the years. ( Sabaz, 2024). According to the statistics published by the Ministry of Health General Directorate of Public Health, preterm birth rate is 12.9% in 2022. It has been observed that the chances of survival of premature babies vary greatly according to the income level of the country where they were born. For example, in low-income countries, more than 90% of babies born before 28 weeks of gestation die within the first few days of life, while in high-income countries, the mortality rate is below 10% (Cengiz & Şengelen, 2024).

These babies, whose organs and systems have not yet reached maturity to adapt to the extrauterine environment, require medical treatment, care and support in the NICU due to many health problems. Oral feeding is one of the most common problems experienced by preterm babies in the NICU. Oral feeding is an important and time-consuming stage in the development of a preterm infant. The aim of feeding preterm infants is to ensure their survival and realisation of their genetic growth potential (Sabaz, 2024). The most ideal nutrition for survival, healthy growth and development of all newborn babies is breast milk provided by successful breastfeeding. World Health Organisation (WHO) guidelines and practice guidelines recommend breastfeeding for all infants, including premature infants. Breastfeeding also has optimal nutritional value, improved neurodevelopmental outcomes and



immunological benefits for premature infants (gestational age <37 weeks). Breastfeeding of premature infants, who are vulnerable due to the potential for acute and chronic diseases, is particularly important in terms of the development of the immune system and protection against infections (Boz, 2024). However, NICU breastfeeding rates are generally low.

### **Importance of Breastfeeding in Preterm Infants**

Breast milk is not only a food, but also a living fluid that provides a healthy start to the baby's life and protects it from many risks that life will bring in the future. It also has features to support the development of the newborn and is superior to all artificial foods in terms of nutritional value (Arslan & Yeniterzi, 2013). Babies born prematurely need breast milk more. The reasons for this include the fact that they cannot receive nutrients and immune factors that are passed from the mother to the baby through the placenta during the last trimester, the treatment and interventions applied during the intensive care period increase morbidity/mortality, and their organs and systems are not fully matured. Breast milk is special for preterm babies. Growth factors in breast milk provide the development of organs and systems (Basic Neonatal Care, 2017).

Optimal nutrition of premature infants is critical for their growth and development (Kahraman et al., 2021). Breast milk is a unique nutrient source that provides benefits in many areas such as immune system support, intestinal development and neurological maturation for premature infants (Victora et al., 2016). In premature births, infants' sucking and swallowing reflexes are not fully developed, which makes the breastfeeding process difficult. In addition, these babies may need to be fed in the intensive care unit

depending on their health status (Flacking et al., 2012). However, professional support and breastfeeding-friendly practices provided in the NICU play an important role in ensuring the continuity of breastfeeding. Positive results such as decreased risk of infection, increased growth rate and shorter hospital stay have been observed in breastfed premature infants (Underwood, 2013). Therefore, encouraging and supporting breastfeeding in the NICU is critical for both short- and long-term health outcomes.

With the Convention on the Rights of the Child adopted by the United Nations Children's Fund, it was stated that "breast milk is the best food for babies and that there is a need to inform and support the whole society about breastfeeding and to provide educational opportunities on the subject" (WHO and UNICEF, 2003). In terms of women's and children's health, there is a need for research and guidelines on more detailed scale development or adaptations on important issues such as breastfeeding (Kahraman et al., 2021). Breastfeeding also has optimal nutritional value, improved neurodevelopmental outcomes and immunological benefits for premature infants (gestational age <37 weeks). It is stated that breastfeeding of premature infants, who are vulnerable due to the potential for acute and chronic diseases, provides high immune function and protection against infections (Boz, 2024).

According to a Cochrane study conducted with premature infants, breastfeeding reduces the likelihood of necrotising enterocolitis (Quigley et al., 2019). In addition, a lower incidence of rehospitalisation was observed in breastfed premature infants (Lasby et al., 2023). Breast milk protects the baby from many infections such as diarrhoea, otitis, meningitis, respiratory tract infections

during the feeding process and reduces the infant mortality rate, as well as the frequency of sudden infant death syndrome. It also provides economic and social benefits by shortening the duration of hospitalisation and reducing the need for labour (Celiloğlu et al., 2010). It has been observed that the nutrition of the newborn affects not only its growth and development, but also its brain structure, cognitive and mental health, and can change the socioeconomic indicators of the family and society (Dolgun & Nuraliyeva, 2024). The benefits of breastfeeding for preterm infants are much more than those experienced by term infants. Preterm infants need support and time for breastfeeding due to poor coordination of sucking, swallowing and respiration, inability to maintain physiological stability and problems with breast grasping. Breast milk is the best source of nutrition for preterm babies and frequent breastfeeding helps to provide essential nutrients, support growth, strengthen the bond between mother and baby, reduce breast problems and increase milk production in the mother (Sabaz, 2024).

### **Factors Affecting the Breastfeeding Process in Premature Babies**

A number of maternal and infant factors affect the duration of breastfeeding initiation and breastfeeding behaviour. These reasons are also known to have an effect on the feeding method and time chosen for the baby. It has been observed that many demographic characteristics such as age, education level, socio-economic status have positive or negative effects on the breastfeeding process (Basic Neonatal Care, 2017). Among the factors that prevent breastfeeding in mothers with premature babies, it is seen that the mode of delivery (caesarean section), mother-infant separation after birth, lack of

skin-to-skin contact, pregnancy complications and multiple pregnancy are included. In addition to these factors, anxiety (psychological distress) and depression observed in mothers in this group suppress lactogenesis and are characterised by inadequate breast milk production and delayed breastfeeding (Boz, 2024). Gestational age and birth weight are also known to affect suckling. In addition, the current health status of the infant also affects breastfeeding. The fact that the baby is sick or has a congenital defect, is born with a low Apgar score, vital signs are not between normal values, absence of bowel movements and the baby's sleep-wakefulness state (being in sleep or crying continuously) negatively affect breastfeeding. Failure to initiate breastfeeding in the first half hour of life, when the sucking reflex is the strongest, due to routine hospital practices, and interruption of contact with the mother by taking the baby to a separate baby room may have negative effects on breastfeeding (Basic Neonatal Care, 2017). It is also stated that the lack of knowledge and confidence of mothers of premature infants about breast milk and breastfeeding is another obstacle (Boz, 2024).

### **Difficulties Encountered in the Breastfeeding Process of Premature Babies**

Preterm infants may encounter many obstacles, both physiological and environmental, during the breastfeeding process. Incomplete development of sucking and swallowing reflexes is one of the main reasons that make it difficult for preterm infants to suck breast milk directly. This may affect adequate nutrition and weight gain (Meier et al., 2007). However, preterm infants with low energy

reserves may tire quickly during sucking and may not get enough milk (Callen & Pinelli, 2005).

The fact that preterm babies are usually connected to respiratory support or other medical devices further complicates the breastfeeding process by limiting the mother's physical contact with her baby. The presence of ventilators and nasogastric tubes may make it difficult for the mother and baby to bond and to establish skin-to-skin contact during breastfeeding (Flacking et al., 2012). Problems in breast milk production are also among the important factors affecting breastfeeding in preterm infants. After preterm birth, breast milk production may be delayed or decreased due to hormonal imbalances and lack of physical contact. Especially stress and anxiety may suppress the release of milk by mothers (Underwood, 2013). Therefore, multidisciplinary support programmes for both the baby and the mother are of great importance.

### **Physiological Deficiencies**

The sucking and swallowing muscles of premature infants may not be sufficiently developed. This may lead to inability of the infant to effectively grasp the mother's breast and may prevent adequate milk intake (Meier et al., 2007). Respiratory support or other medical devices may complicate the breastfeeding process. These devices may limit the infant's position and reduce physical contact with the mother (Callen & Pinelli, 2005).

### **4.2. Problems in Breast Milk Production**

Milk production may be delayed or decreased in mothers after premature birth. This is associated with factors such as hormonal

changes and limited physical contact (Meier et al., 2007). Limited mother-infant skin-to-skin contact may negatively affect milk secretion. In addition, stress in the NICU environment may suppress milk production (American Academy of Pediatrics, 2012).

#### **4.3. Psychological Factors**

Mothers may experience intense stress and anxiety due to premature birth and the baby being in intensive care. This may negatively affect breast milk production and motivation for the breastfeeding process (Callen & Pinelli, 2005). Mothers' feeling of inadequacy and pressures from the environment may create an additional difficulty in the breastfeeding process.

#### **4.4. Infant Energy Level and Growth Problems**

Premature babies have limited energy reserves and may tire quickly during sucking. This may shorten the feeding time and cause the baby to be undernourished (Meier et al., 2007). Slow weight gain and growth retardation may affect the sustainability of breastfeeding.

### **5. Factors Facilitating the Breastfeeding Process in Premature Infants**

Although the factors that prevent breastfeeding duration are complex, some of these factors can be improved through intervention. Therefore, it is extremely important to learn the factors that facilitate breastfeeding. It is stated that admission of mothers with premature babies to the NICU together with their babies, skin-to-skin contact, early initiation of breastfeeding and abundant breastmilk milking facilitate the breastfeeding process (Boz, 2024). Oral feeding trials should be started as soon as possible by observing the coordination of sucking and swallowing and in cases where

respiratory and cardiac functions are stable. Kangaroo care should be applied throughout the feeding process and nonnutritive sucking trials should be started. Oral feeding trials should be initiated in line with individual needs, taking into account the sucking desire and performance of the baby (Guide for Feeding Premature and Sick Term Infants, 2018). In order to encourage breastfeeding in premature babies who are not strong enough to suck from the mother's breast or in risky newborns, manual milk expressing should be started within 6 hours at the latest after birth. (Ministry of Health Breastfeeding Counselling Handbook, 2015). Within the framework of clinical studies and practices in term, preterm and low birth weight babies, kangaroo care has been determined to be effective and beneficial in controlling temperature, breastfeeding and providing mother-infant interaction. Various studies have shown that kangaroo care facilitates the baby's access to the breast, increases breast milk production and positively affects breastfeeding success. In addition, studies have shown that kangaroo care increases the rate of breastfeeding during hospital discharge and provides longer breastfeeding (Peker, 2015). In addition to all these, breastfeeding self-efficacy of mothers with premature babies is associated with their skills and knowledge about breastfeeding. The study by Brockway et al. in 2023 suggests that breastfeeding self-efficacy is the only factor that can predict breastfeeding of preterm infants being discharged from the NICU (Boz, 2024). It is also stated that breastfeeding self-efficacy is a modifiable and improvable factor in order to improve breastfeeding outcomes in premature infants. In this context, it is stated that the higher the mother's breastfeeding self-efficacy, the higher the probability of both initiating

breastfeeding and prolonging breastfeeding. It is emphasised in the existing literature that breastfeeding support is extremely important to improve the breastfeeding outcomes of premature infants (Currie & Dosani, 2017). Similarly, social support among mothers with premature infants is shown to be an improvable factor that facilitates the breastfeeding process and is associated with breastfeeding duration (Boz, 2024).

## **6. Supporting Breastfeeding of Mothers of Preterm Infants in NICU**

Many physiological, psychological, economic, social and motivational reasons affect the success of breastfeeding in this interactive process in which the needs of mother and baby are met and new skills are acquired (Dinçel & Özdilek, 2021). It comes to the fore that there is a need for research and guidelines on more detailed scale development or adaptations for important issues such as breastfeeding on women's and children's health (Kahraman et al., 2021). The Breastfeeding Awareness Scale can be used as a guide to increase the mother's level of awareness of the breastfeeding process. Especially for mothers of preterm infants, this scale helps to identify emotional, physical and cognitive support needs. The World Health Organisation (WHO) and UNICEF, "Protecting, promoting and supporting breastfeeding: Baby-friendly hospital initiative for small, sick and preterm newborns": The aim of this guideline is to create a system of care for premature infants that emphasises the provision of breastfeeding ( <https://www.who.int/publications/i/item/9789240005648> ). Supportive hospital policies are cited as a key condition for improving breastfeeding outcomes for premature infants in the



NICU. The Academy of Breastfeeding Medicine recommends breastfeeding support in hospital and post-discharge outpatient settings to strengthen breastfeeding outcomes in premature infants (Boz, 2024). Although generally accepted protocols regarding the nutritional management of premature infants after discharge have not yet been developed in our country, it is seen that "Baby-friendly NICU practice" has become widespread in our country with the aim of promoting, supporting and protecting breastfeeding and breastfeeding of premature infants hospitalised in NICUs in various countries in recent years (Kültürsay et al., 2018).

## **7.Breastfeeding Support and Role of the Nurse in NICU**

Nutritional requirements and food enrichment of premature newborns can be met by enteral or parenteral routes. For this reason, it should be aimed to give breast milk as soon as possible after birth. The most ideal feeding method for the newborn is breastfeeding with the mother's own milk. It has been observed that the nutrition of the newborn affects not only its growth and development, but also its brain structure, mental processes and mental health, and can also change the socioeconomic criteria of the family and society (Dolgun & Nuraliyeva, 2024). In premature babies, oral care with colostrum and minimal enteral nutrition assistance are of great importance, even in the smallest and sickest babies. During their stay in the neonatal unit, it is recommended to provide nonnutritive sucking support through kangaroo care, pacifier use or empty breast. These practices both support the development of the sucking reflex and contribute positively to the general care processes by increasing the oral-motor skills and calming ability of the baby (Wang et al., 2020; Türkyılmaz et al., 2018).

The period of starting breastfeeding in a preterm baby is very important. The coordination of preterm babies against sucking and swallowing should be observed and when they are stable, attempts to switch to breastfeeding should be started without delay. For preterm babies or babies with health problems who are not strong enough to be fed by sucking from the mother's breast, breast milk should be expressed immediately after birth, continued if it can be given to the baby, and the unused amount should be preserved by providing the necessary conditions (Terek & Yalaz, 2019). Although gestation week and weight are important indicators to evaluate whether premature infants are ready for breastfeeding in the intensive care unit, they are not sufficient alone. These skills can be acquired faster in premature infants. Implementation of non-nutritive feeding (with the help of expressed breast milk or pacifier) from the first moment, providing skin-to-skin contact by kangaroo care are effective on the development of the baby and increasing the sucking ability ( Dolgun & Nuraliyeva, 2024). The American Academy of Paediatrics (AAP) recommends certain criteria for the discharge of preterm infants. One of these criteria is that the infant should be able to feed orally independently. (American Academy of Paediatrics (APA), 2008). When preterm newborns are found to be ready for oral feeding, it is recommended to start feeding directly with breastfeeding. For this reason, approaches to facilitate oral intake should be implemented until the newborn is able to complete its nutritional needs by sucking the mother's breast on its own. Recently, it has been emphasised that many practices, including oral stimulation before feeding, non-feeding sucking movements and sensory/movement-based interventions, affect the ability to feed

orally and the process of transition to oral intake without the need for assistance (Sabaz, Gözen 2023). Sucking and oral motor development practices, which are not intended for feeding, can be applied separately or together. When used together, it is thought to have an effect on the earlier development of sucking-swallowing-respiratory orientation (Zhang et al, 2014).

It is stated that the fact that all healthcare professionals are trained to convey the following message to the mothers of preterm infants from the first moment onwards greatly increases the success of breastfeeding: "Your milk is medicine, it protects your baby from many health problems and complications that may develop during and after hospitalisation in the NICU". Mothers who have given or will give birth to premature babies should be visited by an experienced education nurse through antepartum / intrapartum / postpartum visits and information about breastfeeding and milk expression should be given. Breastfeeding guidance should continue in the postnatal period (Kültürsay et al., 2018). It focuses on the training of health professionals to provide mothers with accurate information, counselling and support related to breastfeeding (WHO, 2009). For successful and effective breastfeeding, the baby should be placed on the breast with the correct techniques. Before starting breastfeeding, the mother should take a position in which she feels comfortable. In ensuring the transition of preterm infants to oral feeding, the nurse has an important role in implementing interventions to support oral feeding by observing in line with cue-based feeding criteria and starting breastfeeding as soon as possible (Sabaz, 2024). Supportive hospital policies are shown as the basic condition for improving breastfeeding outcomes for premature

infants hospitalised in the NICU (Boz, 2024). The Academy of Breastfeeding Medicine recommends breastfeeding support in hospital and post-discharge outpatient settings to strengthen breastfeeding outcomes of premature infants (Academy of Breastfeeding Medicine, 2011). Although generally accepted protocols regarding the nutritional management of premature infants after discharge have not yet been developed in our country, "Baby-friendly NICU practice" is becoming increasingly widespread in our country with the aim of promoting, supporting and protecting breastfeeding and breastfeeding of premature infants hospitalised in NICUs in various countries in recent years. Nurses play an important role in helping mothers with premature babies to maintain breastfeeding (Boz,2024). It has been stated that one of the main reasons for inadequate breastfeeding is inadequate education on breastfeeding. For this reason, women need support related to breastfeeding during pregnancy and postnatal period. It has been observed that correct and effective breastfeeding support has positive effects on the initiation and continuation of breastfeeding. In order to explain the importance of breastfeeding and breastmilk and to ensure the continuity of breastfeeding, there is a need for innovative educational methods that cover all media tools, reach different segments of the society, create sensitivity and are constantly kept up to date. Information transfer and sharing can be done easily and effectively, especially through communication networks such as telephone, short message service (SMS) and internet (Gölbaşı et al., 2019). During breastfeeding, the mother's voice, smell and skin-to-skin contact provide positive sensory reactions and physiological stability in the preterm baby. In this way,

breastfeeding supports the transition to oral feeding (Sabaz, 2024). If a woman does not attach enough importance to breastfeeding or does not believe that she can be successful in breastfeeding, her motivation decreases and the possibility of continuing breastfeeding decreases. It is known that mothers with autonomous motivation breastfeed their babies for a longer period of time compared to mothers with SCM, whereas breastfeeding mothers with controlled motivation breastfeed their babies for a shorter period of time. Implementing interventions that support mothers' autonomous motivation in the prenatal period and monitoring their motivation levels and breastfeeding maintenance are critical for successful breastfeeding (Şahin & Özerdoğan, 2018). Studies show that kangaroo care calms babies, supports weight gain, helps the breastfeeding process to start earlier, prolongs breastfeeding time and increases the amount of breast milk intake. In addition, it is stated that kangaroo care facilitates the mother's feeling of self-sufficiency and adaptation to the role of motherhood, helps to strengthen mother-infant attachment and increases the frequency of breastfeeding. The mother's willingness to breastfeed may be an important factor in increasing breastfeeding success. The results of the study show that kangaroo care increases the level of breastfeeding self-efficacy in mothers of premature infants. It would be in the best interest of both the baby and the mother for neonatal nurses to direct parents to provide kangaroo care and to ensure the continuity of this care before and during breastfeeding. Considering that kangaroo care improves breastfeeding self-efficacy and strengthens the mother-infant bond, it may be useful to continue this practice in the post-hospital period to support the breastfeeding

process (Geçici, Geçkil, 2020). Appropriate nursing interventions in line with problems related to breastfeeding help mothers to encourage their babies to feed their own milk and to have an effective breastfeeding process. Nurses have important duties and responsibilities in preventing and solving breastfeeding problems, increasing the rate of breastfeeding and maintaining effective breastfeeding. Planned breastfeeding trainings, telephone calls, home visits, counselling, individual support and care practices are effectively implemented by nurses during pregnancy and postnatal period. Nurses should support the continuation of breastfeeding with correct nursing practices throughout the breastfeeding process and contribute to the baby's breast milk intake by providing the necessary training to the mother. It is necessary to support mothers to gain the necessary knowledge and equipment to ensure that they maintain breastfeeding effectively. In the study conducted by Akgün and Taştekin, it was determined that practices that help women to increase their knowledge about breastfeeding, gain desire and correct behavioural skills increase breastfeeding success. In another study, it was emphasised that breastfeeding education provided with the teach-back technique was an effective way to increase mothers' breastfeeding success and breastfeeding self-efficacy. Nurses should determine the factors that may affect breastfeeding, such as the importance given by mothers to breastfeeding, sociocultural and personal characteristics, and provide guidance services in this direction. Nurses should first express the benefits of breastfeeding and breast milk to mothers. Afterwards, they should educate the mother about the correct positions for breastfeeding, the baby's stomach volume, the symptoms seen when the baby is full, the

adequacy of breast milk, expressing and preserving milk, breast care and correct bra use. In addition, they should provide guidance on the practices to be done regarding the breastfeeding problems of the mother that may arise. Physiological, structural, mental, etc. that may arise due to the mother or baby. planning of nursing / midwifery practices related to many problems helps to achieve successful results. In line with all these results, it is recommended that nurses effectively apply their educational, counselling and care-giving roles to prevent and solve breastfeeding problems, support breastfeeding motivation and increase breastfeeding success rate. (Çerçer & Nazik, 2023).

## **8. Breastfeeding Awareness and Supportive Practices in NICU**

### **8.1. Frequent Breastfeeding / Milking**

The most ideal and recommended feeding method for babies is for the mother to give milk by breastfeeding her baby. Sometimes it is not feasible for babies to suckle due to reasons caused by the mother or the baby. In such cases, there is a need for the mother to express and store her milk to start milk production or to provide nutrition for the baby. In cases where the mother cannot breastfeed her baby for any reason, she needs to learn how to express milk with a pump and store it under suitable conditions (Altıparmak, 2020) .

### **8.2. Hot Application**

One of the applications that benefit breastfeeding and secretion of breast milk is hot application to the breasts. It is stated that hot applications to the breast before breastfeeding or milking have a positive effect on milk flow (Altıparmak, 2020).

### **8.3. Skin-to-skin contact /Kangaroo care**

UNICEF states in its "10 recommendations for successful breastfeeding in the protection, promotion and support of breastfeeding" that physical contact with the mother should be established within the first 30 minutes immediately after the newborn is born in order to increase breast milk production. Mother-baby contact is a massage interaction with the newborn touching the mother's breast during breastfeeding. This contact helps to increase breast milk production by stimulating prolactin hormone and oxytocin hormone. Thus, breastfeeding continues faster and longer with the effect of skin-to-skin contact. Skin-to-skin contact between mother and baby increases the breastfeeding time, stimulates the parasympathetic system and increases the amount of breast milk. Skin-to-skin contact prevents hypoglycaemia by increasing the sucking success of the baby and contributes to improvement in growth and development rate. In addition, skin-to-skin contact will help the mother to start lactation early, resulting in fewer breastfeeding problems (Altıparmak, 2020). (American Academy of Pediatrics, 2012). (Meier et al., 2007).

#### **8.4. Massage**

Recently, massage is frequently preferred to increase breast milk. As an application that supports breastfeeding, massage applied to the breast activates the milk secretion reflex and contributes to the increase in the energy content and amount of breast milk (Altıparmak, 2020).

#### **8.5. Hypno Breastfeeding**

Hypno-breastfeeding philosophy is an approach used to enable mothers to focus on the breastfeeding process in a positive and



relaxed way. It is aimed to support the breastfeeding process with the help of affirmation sentences / suggestions to the mother. The aim of hypno-breastfeeding philosophy is to eliminate fear and anxiety. In this way, the mother supported by the hypno-breastfeeding practitioner thinks positive things about breastfeeding and experiences a smooth, calm, comfortable breastfeeding period. Hypno breastfeeding stimulates the release of prolactin and oxytocin by reducing the level of adenocorticotrophic hormone and is a treatment approach that can contribute to increasing breast milk (Altıparmak, 2020).

## **8.6.Training and Consultancy**

Another practice that supports breastfeeding is to help inform the mother. Within the framework of trainings and counselling to support breastfeeding, it is of great importance to provide the mother with all the training she needs to know about breastfeeding. In addition to being a natural process, breastfeeding is a process that involves both learning and teaching experiences of mothers. Therefore, the information and practical support provided by health professionals to mothers in the early postpartum period plays a critical role in the successful maintenance of the breastfeeding process. In order for mothers to breastfeed their babies adequately and effectively, they should understand the value of breast milk. In addition, it is stated that effective breastfeeding, breastfeeding techniques, and the education given to the mother by breastfeeding have a great effect on the prevention of complications that may arise in the breast, the continuation of breastfeeding and the success of breastfeeding (Altıparmak, 2020).

## **8.7. Technology and Digital Support**

Technological developments offer many innovations to support the breastfeeding process in the NICU:

- **Smart Milking Devices:** Devices that facilitate the milking process of mothers and increase efficiency support milk production (Meier et al., 2007).
- **Digital Breastfeeding Tracking Applications:** Applications that enable mothers to track their milking times, amounts and the baby's feeding pattern provide a sense of control over the process (Flacking et al., 2012).
- **Tele-Counselling Services:** Mothers can receive support for their individual needs by accessing lactation counsellors remotely (Victora et al., 2016).
- **Switchboard Monitoring Systems:** Systems that monitor the baby's health status in real time allow the mother to continue breastfeeding more safely with her baby.

## **9.Conclusion and Recommendations**

In conclusion, comprehensive support should be provided in the NICU to increase breastfeeding rates in preterm infants. Breast milk has a positive effect on infant health and strengthens the bonding between mother and infant. Kangaroo care, lactation counselling and dissemination of breastfeeding-friendly practices are the most important supportive elements of this process. More research and supportive programmes are needed in Turkey to better understand the benefits of breastfeeding on preterm infants.

Awareness-raising strategies should be developed considering the positive effects of breastfeeding awareness on the healthy development of preterm infants. In addition, it is important to implement breastfeeding support programmes in the NICU and to raise awareness of the staff about awareness.

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## **CHAPTER III**

### **The Relationship Between Exposure to Cyberbullying and Social Media Appearance Anxiety and Eating Behavior in Adolescents**

**Şule ŞAHİN EKER<sup>1</sup>**  
**Dilek KÜÇÜK ALEMDAR<sup>2</sup>**

#### **1.INTRODUCTION**

Cyberbullying is a widespread problem, especially through social media platforms, which has negative effects on the psychological and physical health of adolescents (Patchin & Hinduja, 2015). At the same time, social media platforms are full of content that can cause appearance anxiety and unhealthy eating behaviors in young people (Tiggemann & Slater, 2013). Social media, online games and instant messaging applications have

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become central to young people's social lives. However, these digital interactions bring negative behaviors such as cyberbullying as well as positive aspects. Cyberbullying manifests itself in the form of targeting, humiliating, excluding or harassing individuals on online platforms.

## **2. DEFINITION AND TYPES OF CYBERBULLYING**

Cyberbullying is defined as individuals intentionally harming or harassing others through digital platforms (Smith et al., 2008). This can occur in many digital environments such as social media, messaging applications, online games and forums (Kowalski et al., 2014). According to studies, 20% to 40% of adolescents worldwide are exposed to cyberbullying (Sourander et al., 2010). Yaman and Peker (2012) reported that 30% of secondary school students in Turkey are exposed to cyberbullying. In another study conducted by Peker (2015), it was concluded that 17% of students were exposed to cyberbullying, 10.5% cyberbullied others, and 35.2% were both victimized by cyberbullying and bullied (Peker, 2015). In 2021, in a study conducted by Cyberbullying not only threatens the psychological health of the victim, but can also affect key issues such as body perception and eating behaviors (Patchin & Hinduja, 2015). The main types of cyberbullying are as follows:

*Humiliation and Slander:* Mocking, slandering or humiliating individuals on social media platforms.

- *Exclusion:* The exclusion of individuals from online activities or social media interactions by certain groups.

- *Harassment:* Repeatedly sending harassing messages, content or threats.

- *Identity Theft*: The unauthorized use of an individual's identity and posting harmful content on their behalf.

This type of behavior is becoming more prevalent as it often allows the perpetrator to remain anonymous (Hinduja & Patchin, 2010).

### **3. REASONS WHY ADOLESCENTS ARE EXPOSED TO CYBERBULLYING**

There are various factors that increase the risk of adolescents being exposed to cyberbullying. According to the TUIK 2024 Information Technology Usage Survey among Children report, while the rate of internet use among children was 82.7% in 2021, it increased by 10.5% points to 91.3% in 2024 (TUIK, 2024). First, the increase in social media use makes it easier for young people to be constantly online and potentially exposed to bullying cases (Hinduja & Patchin, 2010). In addition, factors such as social pressure among young people, the desire to be popular and the fear of being ostracized also pave the way for bullying (Li, 2007).

Anonymity is also an important factor in cyberbullying; bullies may be bolder in harming their victims by using their anonymity (Barlett & Gentile, 2012). In addition, the lack of physical contact in the online environment may make the severity of bullying less visible to the bully (Slonje & Smith, 2008).

There are many reasons for being exposed to cyberbullying. These reasons include social pressure, personality traits, peer relationships and digital literacy levels.

- *Social Pressure*: Young people become more active in online environments with the desire for social acceptance. The effort to

conform to the behavior of their peers puts them at risk of becoming a target of cyberbullying. Research shows that 40% of young people are bullied by their peers on social media (Pew Research Center, 2018).

- Self-Perception: Adolescents with low self-esteem are more likely to be bullied or bullying. Lack of self-esteem is an important risk factor in cyberbullying incidents (Schneider et al., 2012).

- Digital Literacy: Young people's ability to protect themselves in the digital world affects the bullying situation they experience. Adolescents with low levels of digital literacy may have difficulty coping with online threats.

#### **4. EFFECTS OF CYBERBULLYING**

There are many studies in the literature on the prevalence and effects of cyberbullying. A meta-analysis by Kowalski et al. (2014) shows that cyberbullying has become more prevalent than school bullying and has more lasting psychological effects on youth. In another study, it was reported that 20% of young people exposed to cyberbullying considered suicide or attempted suicide (Hinduja & Patchin, 2010). Another study conducted in Turkey in 2022 showed that 35% of adolescents exposed to cyberbullying experienced psychological effects that resulted in decreased treatment at school and decreased overall sense of well-being (Özdemir, 2022). In addition, Williams and Guerra (2007) found that a large proportion of young people who are bullied online do not tell anyone and remain silent. This situation reveals that a large proportion of cyberbullying cases are not reported and not included in the resolution processes.

There are various negative effects on the lives of adolescents who are exposed to cyberbullying. These are:

- *Psychological Effects:* Cyberbullying can lead to consequences that can seriously affect the psychological health of adolescents. Depression, anxiety, low self-esteem and suicidal thoughts are more common in young people exposed to cyberbullying (Bauman, Toomey, & Walker, 2013). One study found that 60% of cyberbullied youth had to seek psychological support (Kowalski et al., 2014).

- *Social Effects:* Victims of cyberbullying may also face social problems such as social isolation and lack of interest in school (Tokunaga, 2010). Cyberbullying damages trust in social relationships and can negatively affect victims' relationships with friends. The decrease in social support systems increases feelings of loneliness and social anxiety.

- *Academic Effects:* Victims may underperform in school, experience reluctance to go to school, and face problems such as distractibility. According to one study, the academic achievement of students who are cyberbullied is 30% lower than those who are not bullied (Huang & Chou, 2010). In another study, it was found that the academic performance of students exposed to cyberbullying significantly decreased and these students developed negative attitudes towards school (Patchin & Hinduja, 2010). This suggests that bullying may also negatively affect the social development of young people.

- *Effects on Body Perception:* Social media offers content that can trigger appearance anxiety among young people. Idealized body

images cause young people to compare themselves with these images and this leads to dissatisfaction with their bodies (Tiggemann & Slater, 2013). In a study in Turkey, it was found that with the increase in social media use, appearance anxiety increased in young people and this anxiety was more pronounced especially in female adolescents (Kocaman & Kazan, 2021). This anxiety deepens even more in young people exposed to cyberbullying. Cyberbullying, especially when based on appearance-related criticism, can lead individuals to develop negative perceptions of their bodies (Kowalski et al., 2014). Appearance-based bullying (e.g., making fun of body shape), especially on social media platforms, can damage young people's self-confidence and increase body image concerns (Mishna et al., 2010).

*-Effects on Eating Behaviors:* Cyberbullying can negatively affect adolescents' eating behaviors, especially when it is related to body perception (Puhl & Latner, 2007). In a study conducted in Turkey, it was found that young people exposed to cyberbullying tend to engage in disordered eating behaviors in order to conform their bodies to idealized body norms (Özdemir & İnanç, 2021). These disordered eating behaviors can turn into serious eating disorders such as anorexia and bulimia (Puhl & Latner, 2007). In another study, it was observed that adolescents exposed to cyberbullying resorted to unhealthy eating behaviors such as dieting, overeating or starving (Rodgers, 2016). According to this study, bullying via social media causes young people to feel dissatisfied with their appearance and as a result of this dissatisfaction, they turn to unhealthy eating behaviors (Rodgers, 2016).

## **5. THE RELATIONSHIP BETWEEN SOCIAL MEDIA APPEARANCE ANXIETY AND EATING BEHAVIOR IN ADOLESCENTS**

Social media has become an integral part of young people's daily lives, and significant effects on body perception and eating behaviors among adolescents have been observed through these platforms (Arslan & Kılıçarslan, 2018). The pressure of social media use on appearance anxiety and eating behavior leads to various psychological and physiological problems, especially in adolescents (Altındağ, 2020).

**-Social Media and Appearance Anxiety:** “Ideal body” images that are frequently shared on social media create serious appearance anxiety among young people (Arslan & Kılıçarslan, 2018). Adolescents are exposed to the thin, fit and perfect body perceptions of the people they follow on social media platforms, which causes them to make negative evaluations of their own bodies (Arslan & Kılıçarslan, 2018). This anxiety usually increases as young people tend to make social comparisons and try to achieve the standards that society considers “ideal” (Ergün & Tuncay, 2019). In a study conducted in Turkey, it was revealed that young people who spend more time on social media are more concerned about their appearance and that this anxiety is directly related to the thin body images popular on social media platforms (Şengönül & Aydın, 2023). In addition, it has been observed that this appearance anxiety is more intense especially in girls (Kocaman & Kazan, 2021).

**-The Effect of Appearance Anxiety on Eating Behaviors:** In addition to the information about food, thoughts, emotional state and active behaviors are also effective in determining eating



behaviors (Gökçen, 2024). Appearance anxiety also significantly affects eating behaviors in adolescents. Many studies in Turkey have shown that “ideal body” images exposed on social media platforms can lead to eating disorders in young people (Özdemir & İnanç, 2021). Through social media, young people face pressure to be thin and fit, which triggers eating disorders (such as anorexia, bulimia) and disordered eating behaviors (Şengönül & Aydın, 2023). In a study conducted by Özdemir and İnanç (2021), it was reported that with the increase in the use of social media, eating behaviors in young people changed negatively, irregular eating habits became widespread and excessive dieting tendencies were observed. The study revealed that body images that frequently appear on social media cause young people to feel dissatisfied with their bodies and turn to unhealthy eating behaviors for weight control.

**- The Impact of Filters and Photo Editing Applications on Social Media:** Filters and photo editing applications on social media platforms can further distort young people's perceptions of themselves (Kocaman & Kazan, 2021). Since such applications allow individuals to manipulate their appearance, young people move away from their real-life appearance and may go on unhealthy diets in an effort to achieve the image they display on social media (Turan & Genç, 2020). This further deepens the destructive effects of social media on young people.

**-The Impact of Social Media on Eating Disorders:** Eating disorders have become more common, especially with the ideal body perception created by social media. Studies in Turkey show that eating disorders such as anorexia and bulimia have become widespread with the increase in social media use (Ergün & Tuncay,

2019). Especially young girls tend to excessive dieting and unhealthy eating behaviors in an effort to capture the perfect body images they see on social media (Gül & Akyüz, 2019).

## **6. RESEARCH FINDINGS IN TURKEY**

Research in Turkey clearly reveals the negative effects of social media use on young people. In Arslan and Kılıçarslan's (2018) study, it was concluded that social media use increases appearance anxiety, which leads young people to exhibit disordered eating behaviors. In the same study, it was stated that young people compare themselves with the “ideal” body images they see on social media and this leads to eating disorders.

Another study by Doğan (2019) showed that social media platforms have negative effects on young people's self-perceptions, and with the increase in the time spent on these platforms, appearance dissatisfaction and excessive dieting tendencies among young people also increased.

Turan and Genç (2020) stated that social media filters and photo editing applications distort the body perception of young people and this situation leads to more eating disorders, especially in young girls. This study reveals that manipulated images on social media increase psychological pressure on young people, which negatively affects eating behaviors.

Özdemir and İnanç (2021) found that cyberbullying and social media use are important factors that trigger eating disorders among young people. In the same study, it was stated that with the increase in the duration of social media use, young people develop negative

thoughts about their bodies and are more likely to resort to disordered eating behaviors (Özdemir & İnanç, 2021).

Ergün and Tuncay's (2019) study showed that young people who are frequently exposed to idealized body images on social media experience more dissatisfaction with their bodies and this dissatisfaction negatively affects their eating behaviors. According to the study, cyberbullying also plays a key role in this process; bullying over the appearance of young people paves the way for the formation of unhealthy eating habits (Ergün & Tuncay, 2019).

## **7. CONCLUSIONS AND RECOMMENDATIONS**

Various strategies should be developed to prevent cyberbullying and support victims. Cyberbullying is a serious problem that negatively affects the psychological and social development of adolescents (Tokunaga, 2010). In order to prevent young people from being exposed to such bullying, digital literacy trainings should be increased and family and school support should be strengthened (Willard, 2007). It is also important to ensure that young people exposed to cyberbullying receive psychological support (Bauman et al., 2013).

Social media is also a factor that significantly affects appearance anxiety and eating behaviors of adolescents (Altındağ, 2020). Research in Turkey reveals that social media use leads to appearance anxiety and eating disorders in young people (Arslan & Kılıçarslan, 2018). In order to solve this problem, it is important to increase digital literacy trainings, to make young people more conscious of social media use, and to provide psychological support

especially to young people with appearance anxiety (Turan & Genç, 2020).

Cyberbullying has become a serious problem that negatively affects young people's appearance anxiety and eating behaviors with the increase in social media use (Patchin & Hinduja, 2015). Research in Turkey reveals that young people who are exposed to cyberbullying struggle with their body perceptions on social media platforms and this leads to disordered eating behaviors (Özdemir & İnanç, 2021). In this process, it is important to increase digital literacy trainings for young people, raise awareness of families and schools, and develop more effective policies against bullying on social media platforms (Ergün & Tuncay, 2019). As a result, common solution suggestions are education and awareness, family support and digital literacy.

- *Education and Awareness:* Educational programs should be organized in schools to raise awareness about cyberbullying among students. Such programs should teach young people about the consequences of their online behavior. Teachers should also be trained to become better equipped to deal with this issue. The dissemination of anti-bullying programs and digital literacy trainings in schools can be effective in preventing cyberbullying (Willard, 2007).

- *Family Support:* Families should observe their children's online behavior and communicate openly. . Having strong family support and good social skills can make young people less affected by such bullying (Wang, Iannotti, & Nansel, 2009). Increasing parents' digital literacy is critical to ensure their children's online

safety. Research shows that young people with family support are more resistant to cyberbullying (Mishna et al., 2010). As a society, we need to collaborate so that young people can safely exist online. Combating cyberbullying is not only the responsibility of individuals, but also of society.

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