

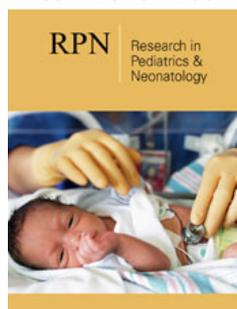
Investigating the Importance of Sleep in Premature Infants: A Review Study

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Abstract

According to the WHO, live infants born before the 37th week of pregnancy from the first day of the last menstrual period are considered premature. Today, progress in medical science, nursing care and improvement of prenatal care (prescribing steroid before delivery, appropriate technology (mechanical ventilation-ventilator)) and improving postnatal care (prescribing surfactant) have led to an increase in the survival of premature babies. This means an increase in the number of babies who need special intervention and support care with the aim of reducing disability and facilitating the growth and development of these infants.

Therefore, most of the premature babies are subsequently admitted to the intensive care unit to continue the treatment process. An environment that not only bears little resemblance to the mother's womb, but also exposes them to countless sensory stimuli resulting from therapeutic-care measures, including high levels of environmental noise, strong lights, and frequent medical procedures. One of the factors affecting the developmental and cognitive process of these patients is their sleep-wake state.

Keywords: Sleep; Premature infant; Sleep; Awake cycle

Abbreviations: NICU: Neonatal Intensive Care; WHO: World Health Organization

Introduction

Lack of sleep's quality during the fetal and neonatal period is associated with lifelong developmental consequences. Early sleep is not only physiologically critical but may be used as a contextual framework for understanding the early organization of brain networks and even the effects of medical adversity on later neural development. In the premature infants, sleep and brain development may be disturbed at the first of their life [1]. Sleep is one of the most important developing processes in the first years of life and plays a role in the development of the cognitive and emotional performance of infants [2]. Sleep is a natural physiological process that plays an essential role in the normal functioning of the body such as the central nervous system and cognitive functions. Sleep is a behavior that has been observed in most organisms and is opposite to wakefulness and is characterized by a decrease in response to environmental stimuli [3].

Sleep plays an essential role in the recovery of premature infants, brain development and energy storage. In the human fetus, the differentiation of sleep states starts from the 27th week of fetal age and a complete sleep period is formed between 25 and 30 weeks of fetal age [4]. Term infants spend 60% and premature infants 70% of their time in sleep. An infant sleeps irregularly for 12 to 18 hours a day and is awake for 1 to 3 hours. The sleep cycle of hospitalized premature infants is fragmented, less differentiated sleep and short periods of quiet sleep compared to term infants [5]. By the end of the first year, babies have spent more than half of their lives asleep, indicating that sleep is an important factor in their development.

Infant's sleep patterns develop rapidly in the first year of life, characterized by inconsistency in the first half but stabilization in the second half. Night-time sleep duration increases steadily during this period, from approximately 8.5 hours in the first two months to between 10 and 12 hours at 12 months, and daytime sleep duration simultaneously decreases from 6 hours to 2.5 hours. Night waking also decreases during the first year [6].

In newborns and infants up to 6 months, sleep occurs in three distinct states: Active sleep, light sleep, and indeterminate sleep. Active sleep, which is the equivalent of rapid eye movement sleep seen in older children and adults, is the primary state of sleep and is characterized by the presence of REM, sporadic movements. Well-defined sleep patterns can be identified as early as 25 weeks of gestational age. Restful and active sleep can be detected as early as 32 weeks of pregnancy with electroencephalography. Restful sleep restores energy reserves as well as cell repair; active sleep is necessary for the structural maturation of the central nervous system, and indeterminate sleep is characterized as a transition between these two types of sleep patterns [7].

There are transitional states in which babies go from sleep to wakefulness or from wakefulness to sleep. Transitional states between wakefulness and sleep are defined as three different states: Drowsiness: When babies are quiet and seem sleepy, with eyes slowly opening and closing. Confusion: When babies are quiet with their eyes open but startled in appearance and Sleep-to-wake transition: When babies show wake and sleep behaviors, but sleep states are present. The presence of specific sleep patterns indicates the maturation of the brain and is necessary for the homeostasis of infants. In the early stages of brain development, active sleep occupies a large part of sleep time and is the main sleep mode until the 40th week of pregnancy. Sleep and wakefulness states are a set of behaviors that show the baby's arousal level, which affects the baby's ability to respond to external stimuli. Accurate assessment of sleeping and waking states enables nurses to understand the physiological needs of the baby and adjust their care time in response to the baby's condition [8].

A newborn's sleep cycle lasts 30 to 70 minutes, starting with REM sleep, unlike older infants and children who have cycles of 75 to 90 minutes, starting with NREM sleep, then entering a deeper stage of NREM sleep, and then entering REM sleep. Most dreams are seen in this phase of sleep. Sleep architecture evolves with chronological age, and term infants spend 50% of their total sleep time in active REM sleep, which gradually decreases as the infant's sleep stabilizes and its total duration decreases [9]. The presence of distinct sleep states indicates brain maturity and is necessary for the homeostasis of infants [8].

Factors affecting the baby's sleep include age, mood, feeding method, parental attachment, interaction between the baby and the environment [10], health literacy, the presence of television in the bedroom, feeding before sleep, stimulating activities during sleep, emotional support and temperament of the baby [11]. Establishing

sleep-wake patterns is a major developmental task during infancy that is influenced by complex interactions between physiological, social, and environmental processes. Although most of the babies sleep uninterrupted at night in the first year of life, the sleep problems of babies, which are mainly manifested in the form of frequent or long night awakenings, are seen in 20 to 30% of babies [12].

Infant sleep disorders are associated with mood problems such as nagging, restlessness and increased crying. Other complications of sleep disorders in babies who had less sleep include abnormal cognitive development, social-behavioral problems (such as separation anxiety) [13]. Several studies in infants show that shorter sleep duration and chronic insufficient sleep are associated with a range of adverse health and developmental outcomes. Hyperactivity, inattention, cognitive dysfunction and emotional symptoms (such as aggression, anxiety and depression) are revealed [14]. Maintaining a sleep-wake cycle is critical to the early neurosensory growth and development of infants, including preterm infants in the NICU. Sleep deprivation in preterm infants may worsen clinical condition, delay hospital discharge, and cause behavioral disturbances in adulthood. The low quality of sleep as a stressful situation, with the release of epinephrine and norepinephrine, increases the heart rate, increases the breathing rate, and increases the oxygen demand of the myocardium of the heart [15].

Discussion

Sleep is one of the most important developing processes in the first years of life and plays a role in the development of the cognitive and emotional performance of infants [2]. Sleep is a natural physiological process that plays an essential role in the normal functioning of the body such as the central nervous system and cognitive functions. Sleep is a behavior that has been observed in most organisms and is opposite to wakefulness and is characterized by a decrease in response to environmental stimuli [16].

Admission to the NICU, which is dramatically different from the intrauterine environment, can affect the development of infant sleep patterns. Unlike the protected experience given to the fetus by the intrauterine environment, the NICU experience is stressful for infants and harmful to their developing brain [3]. Disruption of sleep physiology in late infancy contributes to later adverse neurobehavioral outcomes. Ward noises (including machine alarms, staff conversations, monitors, infusion pump alarms, and telephone rings), intense and prolonged lighting, and frequent invasive and painful procedures are stressful stimuli and factors that cause low Premature infants fall asleep in the NICU [17].

Maintaining a sleep-wake cycle is critical to the early neurosensory growth and development of infants, including preterm infants in the NICU. Sleep deprivation in preterm infants may worsen clinical condition, delay hospital discharge, and cause behavioral disturbances in adulthood.

Conclusion

According to the reviewed studies, sleep is an important physiological and biological process and is very important in the growth and development of infants, especially in their brain development. Environmental stimuli can cause a wide range of sleep disorders and have adverse effects on the development of infants. Therefore, sleep support care should be used both in hospital wards and at home to improve the sleep status of infants.

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