

SYSTEMATIC OR INTEGRATIVE REVIEW

INFLUENCE OF SLEEPING POSITION OF THE INFANT ON SLEEP: AN INTEGRATIVE REVIEW

INFLUÊNCIA DA POSIÇÃO DA CRIANÇA NO LEITO SOBRE O SONO: REVISÃO INTEGRATIVA

INFLUENCIA DE LA POSICIÓN DEL NIÑO EN LA CAMA SOBRE EL SUEÑO: REVISIÓN INTEGRADORA

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ABSTRACT

This study aimed to verify the influence of infant sleeping position on sleep. An integrative literature review was conducted in Pubmed, LILACS, SciELO and Cochrane, with the descriptors, "sleep", "infant" and the terms "position" and "positioning", in Spanish, English and Portuguese, published between 2000 and 2013. Six articles met the criteria for inclusion and exclusion. These studies were categorized into arousal from sleep and sleep stages. The results indicated that in the prone position, the infant had fewer arousal events, enabling deeper active sleep and greater amount of quiet sleep. The supine position is related to a greater amount of active sleep and more arousals, and does not expose the infant to the risk of Sudden Infant Death Syndrome. The supine position results in more arousals than the prone position, however, it promotes greater safety to the infant during sleep.

Keywords: Sleep; Child; Patient Positioning; Nursing Care.

RESUMO

Este estudo teve como objetivo verificar a influência da posição de dormir no sono da criança. Uma revisão integrativa foi conduzida nas bases de dados Pubmed, LILACS, SciELO e Cochrane, com os descritores "sleep", "infant" e as expressões "position" e "positioning", nos idiomas espanhol, inglês e português, publicadas entre 2000 e 2013. Seis artigos que atenderam aos critérios de inclusão e exclusão foram identificados. Os estudos foram categorizados em despertares e estágios de sono. Os resultados indicaram que a criança na posição prona apresenta menor quantidade de despertares, possibilitando sono ativo mais profundo e maior quantidade de sono quieto. A posição supina está relacionada à maior quantidade de sono ativo e mais despertares e não expõe a criança ao risco da síndrome da morte súbita infantil. Concluiu-se que a posição supina possibilita mais despertares que a prona, entretanto, promove mais segurança da criança durante o sono.

Palavras-chave: Sono; Criança; Posicionamento do Paciente; Cuidados de Enfermagem.

RESUMEN

El objetivo de este estudio fue verificar la influencia de la posición de dormir sobre el sueño del niño. Se realizó una revisión integradora en las bibliotecas PubMed, LILACS, SciELO y Cochrane con los descriptores sleep, infant y las expresiones position y positioning, en español, inglés y portugués, publicados entre 2000 y 2013. Fueron identificados seis artículos que atendían los criterios de inclusión. Los estudios fueron clasificados en despertares y etapas del sueño. Los resultados indicaron que el niño en la posición prona presenta menor cantidad de despertares, lo cual permite un sueño activo más profundo y una mayor cantidad de sueño tranquilo. La posición supina se relaciona con una mayor cantidad de sueño activo y de despertares y no expone al niño al riesgo del síndrome de muerte súbita del lactante. Se llegó a la conclusión que en la posición supina hay más despertares que en la prona pero que, sin embargo, durante el sueño, esa posición es más segura para el niño.

Palabras clave: Sueño; Niño; Posicionamiento del Paciente; Atención de Enfermería.

INTRODUCTION

Sleeping is a basic human need and is characterized by decreased responsiveness to external stimuli and reduced interaction capabilities of individuals.¹⁻³ During this period, important neurological and physiological activities occur in the body, such as the formation of synapses, reduced digestive system activity, increased release of growth and thyroid stimulating hormones, decreased cortisol, renin, prolactin and melatonin, as well as variation in the respiratory rate, play an important role in immunity and thermoregulation.^{1,4-7}

According to the maturation of the central nervous system (CNS), the infant's sleep moves from ultradian to circadian rhythms, which are synchronized with hunger, satiety and social interaction, as well as some environmental aspects such as brightness, temperature and noise exacerbation. Some significant changes, such as in the length of sleep and the timing of sleep onset can occur due to these changes, in addition to the gradual transition from a polyphase pattern to long periods of daytime wakefulness and consolidation of nocturnal sleep. Both these changes in sleep organization, as well as in its duration and architecture, occur more significantly during the first year of life and continue throughout childhood and adolescence.^{1,6,8}

In older children, sleep is classified into two stages: active sleep (AS), also known as rapid eye movement (REM) sleep; and quiet sleep (QS), described as non-REM.⁹ Indeterminate sleep is another stage recognized in infants.^{9,10,11,12} Between the transition to the different stages of sleep, individual arousal that reflects the progressive activation of several brain structures occurs, involving subcortical and cortical areas, and can be assessed from the neurological and behavioral point of view.³ Thus, the total sleep period corresponds to the duration of its different stages and arousals, until the infant awakens.⁹

Studies show that different positions of the infant in bed may be related to arousals and that the different stages of sleep, as well, can facilitate neuromotor development and its clinical stability.^{13,14}

The consequences of sleep deprivation in infants establish a relationship with the time remaining in each sleep stage and the frequency of arousals.⁷ Such situations could lead to decreased perception of painful stimuli, increased muscle tone and metabolic rate, with consequent loss of body mass and higher glucose tolerance.¹⁵ In addition, some behavioral changes, such as irritability and crying, may be triggered, compromising family interrelationships.^{7,16}

Due to its importance for infant development, sleeping must be assured and promoted by the nursing team in the care provided, in order to improve the medical condition during situations of hospitalization.^{7,13,14}

The nursing staff which, among others, is responsible for the majority of care provided to infants, must have knowledge

about how positioning in bed can influence the frequency of arousals and the different stages of sleep, in the period of development in which most changes occur. Thus, this study aims to verify how sleep is affected by the position of the infant in bed.

METHOD

This was an integrative literature review, which adopted the methodological strategies proposed by Whittemore and Knafl, which synthesize a subject by means of analysis of results found in articles, enabling the understanding of an issue, as well as the incorporation of evidence from clinical practice.¹⁷

The guiding question proposed was: "How does the infants' position in bed impact his sleep?" In order to identify existing publications in the databases, the descriptors selected were: "sleep" and "infant" in Health Science/Medical Subject Headings (DeCS/MeSH), and the search terms, "position" and "positioning" with the Boolean operators "AND" and "OR", to enable the inclusion of articles that addressed the topic to be investigated. The search for indexed publications was conducted in the *National Library of Medicine (PubMed)* and *Literature Latin American Health Sciences (LILACS)*, the *Scientific Electronic Library Online (SciELO)* and *The Cochrane Library (Cochrane)* databases, from June of 2013 to January of 2014.

The inclusion criteria for the sample were; articles whose titles and/or abstracts contained the selected descriptors or search expressions, indicating the proposed object for research, published in English, Portuguese or Spanish languages, between the period of 2000-2013.

The publications that did not comply with the guiding question were excluded, as well as those that could not be consulted in full text, or in which the analysis of the influence of the infant's position in bed on sleep was associated with variables other than only the position in bed, even when the descriptors were present in the titles and/or abstracts.

Initially, 758 publications were identified, with 691 in Pubmed, 14 in LILACS, 11 in SciELO, and 42 in Cochrane. Among the total, 237(31.3%) articles were excluded because the title or abstract did not contain any of the selected search descriptors or expressions; 494 (65.2%) did not address the proposed issue, despite presenting at least one of the descriptors or search expressions in their titles and abstracts.

A total of 18 articles that met the inclusion criteria were represented by 17 (94.4%) in Pubmed, and one (5.6%) in Cochrane, which was finally excluded due to duplicity. Thus, after careful reading of 17 abstracts, 11 (64.7%) articles were excluded because they did not answer the main question. The six (35.3%) remaining met all inclusion criteria for the study, as demonstrate in Figure 1. Figure 1 shows the flowchart of the selection of the publications obtained through the database.

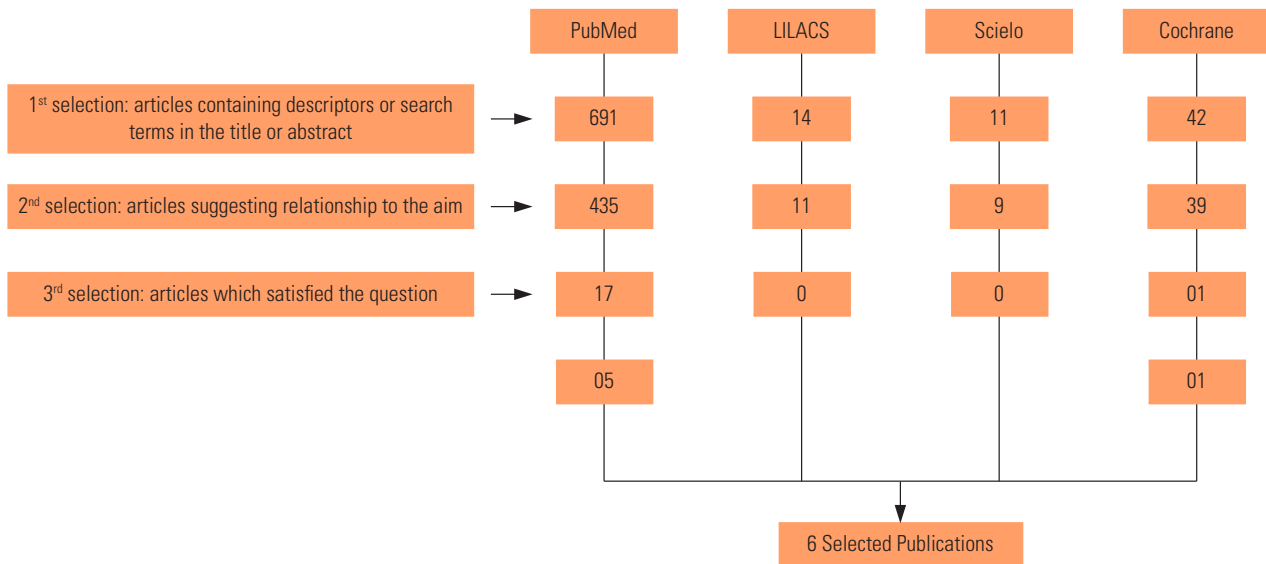


Figure 1 - Flowchart of item selection from the database. São Paulo – SP, 2014.

The level of evidence was considered according to the *Oxford Centre for Evidence-based Medicine Levels of Evidence*.¹⁸

To establish the thematic categories for data analysis, the sleep stages and arousals classification was adopted as a referential.^{3,9} Thus, the articles included in the study were categorized into two themes: sleep stages and arousal from sleep.

RESULTS

All items included in the sample were conducted by physicians and published in English; two were from Australia, one from Israel, one from the United States, one from Taiwan, and one from France.

Tables 1 and 2 synthesize the categorized items exhibited as “arousals from sleep” and “sleep stages”, respectively, with: authorship, year of publication, level of evidence, study design, sample, objectives, and results.

DISCUSSION

Although the findings of this study show that infants present less occurrences of arousals in the prone position, enabling deeper AS and more QS, the research included in this review demonstrated that the supine position is the most appropriate as it promotes longer AS, with a higher frequency of arousals, which does not expose the infant to the risk of SIDS.

The AS is fundamental to the neurosensory development of the infant. During this period, numerous cellular activities occur in the brain, benefiting the process of learning, memo-

ry and preservation of brain plasticity.^{11,12,24} Sleep is one of the main activities of the infant’s body in the early days of life, as the full term newborn and preterm require an average of 17 to 20 hours of sleep, respectively, for the homeostasis of the body.¹⁰⁻¹² Between six and nine months of age, the infant starts to sleep 10 – 12 hours at night, and 2-4 hours during the day; between 8 – 10 years of age, the infant will sleep 9 – 10 hours at night.¹ The literature shows that the lower the gestational age (GA), the greater the AS duration, corresponding to 80-90% of the total sleep cycle in the premature newborn, and around 60% in full-term newborns. As infant development occurs, the proportion of AS decreases, based on the total sleep time.⁹

The QS also performs an important role in infant development, because it is associated with maintaining energy, increasing protein synthesis, and releasing growth hormone, in addition to being essential for the development of long-term memory and learning.²⁴ Within this context, this sleep pattern represents about 20 – 30% of a cycle in the near full term neonate, and this ratio increases so that, in the end of the first month of life, each pattern (AS and QS) constitutes 50%.⁹

In the prone position, one study found that healthy infants may exhibit decreased cortical arousals during AS, as this position tends to exhibit less responsiveness to environmental stimuli and the body itself, such as, for example, an oropharyngeal obstruction which is the main risk factor for SIDS.³ This study did not identify a significant difference in the frequencies of subcortical activations during AS and QS, or in cortical arousals during QS, when the results obtained from changing position from supine to prone were compared.³

Table 1 - Description of the articles identified in the databases, in category "arousals from sleep". São Paulo – SP, 2014

Authors/year of publication/ level of evidence	Study design and sample	Objective(s)	Result(s)	Conclusion
1. Sahni R, Schulze K, Kashyap S, Ohira-Kist K, Fifer W, Myers M ⁽¹⁹⁾ / 2005 Level of evidence: 2	Study design: Prospective, randomized Population/Sample: 63 newborn, healthy, gestational age between 26 – 37 weeks	Evaluate the effects of prone and supine position on the electrocortical activity of infants during active and quiet sleep.	In the prone position, newborns showed less brain activity during AS, reducing arousals. In this same position, newborns demonstrate more variation in sleep states, suggesting a poorer quality sleep.	The changes in EEG tracings due to the prone position suggest that this position promotes a deeper AS. These changes on EEG activity may be related to mechanisms associated with decreased arousals in the prone position and, in turn, to the increased risk of sudden infant death syndrome (SIDS).
2. Horne RS, Ferens D, Watts AM, Vitkovic J, Lacey B, Andrew S, Cranage SM, Chau B, Adamson TM ⁽²⁰⁾ /2001 Level of evidence: 3	Study design: longitudinal Population/sample: 24 healthy full term newborns, gestational age between 38 and 42 weeks; assessed after 2-3 weeks and at 2-3 and 5-6 months of age	Investigate whether the prone position affected arousals from sleep in healthy infants.	In the prone position, the infants evaluated at 2-3 weeks and 2-3 months of age had significantly higher events of arousals in AS and QS. These events were not presented by infants when reaching the age of 5-6 months	The prone position significantly harmed arousal in AS and QS in healthy full term newborns until the age of 2-3 months .
3. Horne RSC, Bandopadhyay P, Vitkovic J, Cranage SM, Adamson TM ⁽²¹⁾ /2002 Level of evidence: 3	Study design: Longitudinal. Population/sample: 14 healthy premature newborns with gestational age between 30 and 35 weeks, evaluated on four occasions: at 36 to 38 weeks of corrected age, 2-3 weeks after birth, at 2-3 months and 5-6 months old.	Investigate whether the prone position affected arousals from sleep in healthy premature infants.	Arousals were significantly higher in AS and QS of premature newborns in the prone position, assessed at birth and with 2-3 months of age. The same result was not observed in these infants when they reached 2-3 weeks and 5 to 6 months of age.	The prone position significantly harmed the arousals from AS and QS in healthy premature born infants in the age at which the risk of SIDS is higher.
4. Kato I, Scaillet S, Groswasser J, Montemitro E, Togari H, Lin JS, Kahn A, P. Franco ⁽³⁾ /2006 Level of evidence: 3	Study design: non-randomized controlled trial. Population/sample: 24 healthy infants with gestational ages between 38 and 41 weeks.	Assess whether the prone position affected the process of arousal in healthy infants.	In the prone position, the infants had significantly less cortical arousals during SA (p = 0.043) compared with the supine position. There were no significant differences in cortical arousals between the two groups (supine or prone position) during the QS. Between the supine and prone positions, there were no significant differences in the frequencies of subcortical activations during AS and QS. The ratio between cortical arousal did not show significant differences between the supine and prone positions.	Sleeping in the prone position decreased the frequency of cortical arousals, but did not change the frequency of subcortical activations, as in victims of SIDS.
5. Peng NH, Chen LL, Li TC, Smith M, Chang YS, Huang LC ⁽²²⁾ /2013 Level of evidence: 3	Study design: quasi-experimental study. Population/sample: 22 premature newborns with gestational age less than 37 weeks	Evaluate the effects of bed positions on the states of sleep and wakefulness and the stress behaviors in premature newborns exposed to environmental stressors in a neonatal intensive care.	In the supine position, the premature newborns between 30 and 35 weeks gestational age had higher mean percentage of arousals (32.5%) compared with the prone position (13.4%).	The prone position is ideal for promoting sleep, as it reduces the occurrence of arousals.

Table 2 - Description of the articles identified in the databases on the category, "stages of sleep". São Paulo – SP, 2014

Authors/Year of publication/ Level of evidence	Study design and Population/Sample	Objective(s)	Result(s)	Conclusions
1. Jarus T, Bart O, Rabinovich G, Sadeh A, Bloch L, Dolfin T, Litmanovitz I ⁽²³⁾ /2011 Level of evidence: 2	Study design: randomized prospective Population/sample: 32 premature newborns, with mean gestational age of 30 weeks	Evaluate the influence of prone and supine position on sleep states and behavioral responses of preterm infants.	The prone position increased the amount of QS as opposed to supine. There were more quiet, active and agitated awakenings in the supine position. The prone position facilitated AS and QS in similar proportions, while in the supine position, greater numbers of AS were present.	There was a significant association between sleep position and preterm infant behavior. The prone position promotes and encourages self-regulation behaviors, crying less, leading to infants moving less in that position. The supine position exposes infants to a wide range of environmental stimuli, disturbing their sleep.

Thus, it is evident that the prone position in bed only influences the occurrence of cortical arousals during AS, and does not cause changes in the frequency of cortical arousals during the QS and in subcortical activations. Studies, whose samples were composed of healthy full term and preterm infants, found that the prone position constitutes a factor that significantly affect both arousal in AS and in QS, due to the increase in the threshold of this event.^{20,21}

Analyzing the relationship between sleep and the positioning of the infant, investigations found reduced occurrence of arousals in the prone position, which can result in increased total sleep time.^{19,21} Only one of these studies indicated a relationship between reduction of arousals and promotion of deeper AS.¹⁹ In the prone position, premature newborns exhibit similar amounts of QS and AS^{23,24}, however in the supine position, longer AS was identified.²³ Another study reported an association between the supine position, decreased spontaneous arousals during QS, and increased duration of AS when infants were contained by wrapping.²⁵

Relating some of the behavioral states of premature newborns with different positions in bed, non-nutritive sucking, handling, and social interaction, research reported longer QS when the newborn remained in the lateral position, and when non-nutritive sucking and social interaction were present, and there was a lack of manipulation. Absence of manipulation was determinant for longer AS in lateral and prone positions, as well.²⁴

The results of this study allow us to realize the importance of the child position in bed for preservation and promotion of sleep, especially in situations of stress, such as hospitalization.^{26,27} Nurses are of prominent importance in terms of quality and total sleep time, both of which are influenced by the position of the newborn infant in bed, a very common care consideration in clinical practice.

On the other hand, the reduced frequency of arousals identified in the prone position constitutes a risk factor for SIDS. Infants in critical situations, under continuous monitoring and professional supervision, can be positioned in prone position for better quality and total sleep time, as long as their

safety is guaranteed by the stability of clinical parameters, such as percutaneous arterial oxygen saturation and heart rate.

Thus, the knowledge held by nurses about the advantages and disadvantages of the supine and prone positions, can evaluate and guide the team and family regarding the most appropriate and safe positions for the infant in bed during sleep, both in the hospital as well as later, at home.

The limitation of this study is in the lack of research available assessing the influence of the lateral position of the infant for sleep, and the lack of studies meeting the established inclusion criteria, making it difficult to establish strong evidence-based conclusions.

CONCLUSION

The infant position in bed affects sleep, with supine being the most favorable, as it enables longer AS and safety due to the lower threshold of arousals, contributing to the reduction of SIDS. Meanwhile, the prone position provides for fewer arousals, enabling deeper AS and larger amount of QS.

With regard to total sleep time and frequency of awakenings and sleep quality, the prone position presents itself as the most favorable, although it is less safe and not indicated by specialist societies, such as the Brazilian Society of Pediatrics, due to the risk of SIDS.²⁸

Further studies are necessary addressing the supine position in bed, as well as sleep quality associated with other variables which are poorly explored in the literature, as well as different stages of infant development and bed restraint use in infants during sleep, in order to compile results for development and implementation of protocols for the care of hospitalized infants.

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