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Review Article

Infant Obesity in Relation to Sleep

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Abstract

Research has shown that obesity beginning in infancy is increasing rapidly in the United States and is very difficult to treat. Correlations have been identified between poor sleep and infant obesity. Interventions currently used by research show insufficient evidence of positive effects later in life. The objective of this paper is to define the issue of infant obesity in relation to sleep, review the evidence of non-pharmacological interventions for infant obesity and sleep in current literature, and to suggest implications for future nursing research.

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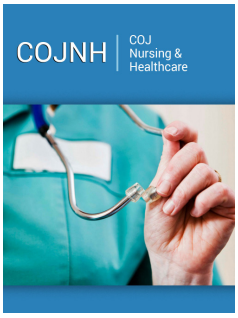

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Infant Obesity in Relation to Sleep

The Centers for Disease Control and Prevention (CDC) defines obesity as, "a BMI at or above the 95th percentile for children and teens of the same age and sex" (2016). According to Mihrsahi & Baur [1], over forty-one million children less than five years old are obese or overweight globally. "Obesity prevalence among infants and young children has increased rapidly during the past 4 decades, a disturbing trend given early obesity's association with later life obesity and its comorbidities" [2]. Obesity beginning in childhood and infancy can be very difficult to treat (International Union of Food Science and Technology and the Institute for Nutrition Research of the Green Meadow Foundation, 1971). Links between infant sleep quality and obesity have been found on numerous occasions [3]. Sleep timing patterns may also contribute to obesity risk [3].

Factors able to be modified during infancy have been researched thoroughly and identified; yet effective interventions have not been found. Childhood and infancy are ideal targets for intervention of obesity as at this age there is much "behavioral and metabolic pasticity" [4]. Birch [1] concludes that infant weight gain may be combated through nutrition and sleep. Interventions currently suggested by the literature show little evidence of positive effects later in life. The objective of this paper is to define the issue of infant obesity in relation to sleep, review the evidence of non-pharmacological interventions for infant obesity and sleep in current literature, and to suggest implications for future nursing research.

Method

In order to achieve this goal, search strategies included use of MEDLINE, CINAHL, EBSCOhost, and PubMed. Research articles were narrowed to include dates from August 1971 to present. Current research focus included August 2013 August 2018. Key words included infant, child, obesity, sleep duration, and temperament. Two hundred fifty-seven articles were cued based on the search criteria. Included in the review were studies focusing on historical obesity overview, current links between obesity and sleep, gaps in research, infant nutrition in relation to sleep and obesity, infant temperament, infant parenting, and interventions. Childhood obesity research for greater than three-year-old was excluded from the research. Articles were further narrowed based on relevance to the purpose of non-pharmacological interventions. Two studies were identified as useful to describe background information for infant sleep and obesity, and six research pieces were recognized as relevant to provide adequate information on non-pharmacological interventions. The articles were then categorized based upon types of non-pharmacological approaches.

Review of Literature

Infant nutrition

A key point in research on infant obesity has been linked to nutrition. Cloutier et al. [5] found obesity associated behavioral interventions such as breastfeeding, juice/sugar-sweetened drinks, solids; infant sleep interventions; and education were effective in decreasing nighttime awakenings. Foods containing tryptophan have been researched to identify their effects on infant sleep. These foods include milk, soy, spinach, eggs, soy, poultry, salmon, and seeds. Not only the type of nutrients consumed, but also the timing of consumption has been known to aid in sleep behaviors. "Both the type of nutrients consumed and the timing at which they were consumed, relative to sleeping time, have been reported to influence infant sleep. Some nutrients have been shown to naturally fluctuate in maternal breast milk with circadian rhythm, and nutrients such as tryptophan, nucleotides, essential fatty acids, and Omega-3 long-chain fatty acids have been suggested to impact infant sleep" [6]. The Centers for Disease Control and Prevention is in agreement with these facts and promote breast feeding as way as to combat the obesity epidemic. Additionally, Cubero et al. [7] state nutrients such as tryptophan aid in sleep and maturation of the central nervous system.

Infant temperament

Boles [8] concluded that families with risk factors for obesity and behavioral/temperament disturbances were also at a greater risk for "problematic sleep." Differences in infant temperament have been shown to be a determining factor of infant sleep quality and nutritional intake. Gestures such as smiling, laughing, pleasure, and vocal reactivity were related to positive interactions. Altered interactions may be identified in both underweight and overweight babies. Infants with temperaments identified from parents as fussy and poor sleepers were associated with increased risk for obesity [9]. Parental overfeeding in response to temperaments of the children are characteristics noted in some obese infants [10].

Infant parenting techniques

Obesity and sleep interventions are not just targeted at the children and nutritional intake themselves. Parents play an important role in fighting this epidemic. Interventions in which parents were involved and compliant with guidelines were more likely to have a positive outcome in short term follow up studies [11]. In one three year follow-up study of interventions of education and group therapy for parental nutrition and sleep, "the odds of obesity were halved" [12].

Parenting also involves modifications of the infant's environment. Environment not only includes nutrients available, sleeping placement, and risk factors such as smoking, but also family dynamics. Khatiwada et al. [13] noted higher levels of "chaos" in the household was a risk factor for increased weight by the age of twelve months Breast feeding and sleep are interrupted by such environmental factors and associated with increased stressors for infants and children.

Physical interventions for infant obesity

"Sedentary behaviors and sleep" are early life risk factors for childhood obesity [1]. Physical activity is the first intervention listed for decreasing obesity in adults. However, such intervention may not be appropriate for infants and children. "Not all infants are developmentally able to participate in physical activities to decrease obesity and instigate better sleep" [14]. The varying levels of physical ability and compliance of parental guidance during physical activities have led to conflicting studies in which physical interventions have not been ultimately successful. No single physical activity or regimen has been linked to decreasing infant/childhood obesity.

Conclusion

It is evident through this literature review that infant obesity is a topic of deligent research. Resources have been focused on identifying both innate and environmental factors. Sleep characteristics and nutritional intake are intertwined in the epidemiology of infant obesity. Factors of nutrition, temperament, and parenting are positively linked to increased risks of obesity. These key factors are the foundation of research necessary for defining the needed methods of intervention for combating infant/childhood obesity. "Obesity is considered one of the most serious public health challenges of the 21st century" (World Health Organization, 2018). Ulrich & Hauck [13-18] state it best when saying, "Given the complexity of the obesity problem, no single strategy for prevention should be expected to be very successful". More research is necessary to define the multifaceted approach needed to provide positive long-term outcomes for infants at high risk for obesity and sleep difficulties.

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