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Article

Sleep Disorders in Pediatrics Associated to Underlying Diseases. Cross Sectional Study

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Abstract: Sleep disorders are a frequent problem in pediatrics. The prevalence is variable (from 15 to 50%) although the majority of papers coincide in that 1 every 3 kids can experiment some kind of sleep disorder. Underlying medical problems usually manifest by difficulty to fall asleep or stay asleep. The diagnosis and resolution of the medical problems with the specific treatment should be the prime concern, before starting with the treatment of the sleep behavioral problem

Keywords: sleep; sleep problem; conductual sleep disorder; night awakening; sleep coach

Introduction

Sleep disorders are a frequent problem in pediatrics. The manual "The Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood- Revised (DC: 0-3R)" encompasses them under the diagnosis "Behavioral sleep disorders" and should be considered when a sleep disorder is the only behavioral problem in a kid younger than 3 years old. The prevalence is variable (from 15 to 50%), although the majority of the papers coincide in that 1 every 3 kids can experiment some kind of sleep problem including resistance to go to bed or waking up in the middle of the night. (1, 2).

On occasions behavioral sleep problems in young children can continue further than early childhood (3). Zuckerman, Stevenson and Bailey (1987) observed that 40% of the infants who had a sleep disorder, continued showing it until the early infancy. Currently there is no discipline exclusively in charge of these problems, being a study object in pediatrics, infant psychology, and child care amongst others. There are also "sleep coaches" or "sleep advisors", individuals of various backgrounds, who by different ways (especially social media) offer services to families struggling with behavioral sleep problems, in the majority of the cases with no medical nor psychological education (4,5).

At this time, there is no universally accepted definition of "sleep coach", nor are there clear guidelines regarding educational background, training requirements, scope of practice, or credentialing (6,7).

Following Dr. Ferber's and Dr Estivil's method (8,9,10) the "sleep coaches" apply different techniques such as let the children cry it out in a controlled manner in order for them to learn to sleep without parent's intervention. However, if a child is in pain or has an ailment, letting the baby cry it out for a prolonged period of time could trigger neuropsychological sequelae in the future (11,12).

Underlying medical problems such as failure to thrive (14, 15), esophagitis, gastro esophagic reflux (16, 17), cow's milk protein allergy (18), atopic dermatitis (19, 20), asthma, oral breathing (21, 22) or obesity, they all usually manifest with difficulty to fall asleep or maintain sleep (23, 24).

The diagnosis and resolution of the medical problems with the specific treatment should be the prime concern, before starting with the treatment of the sleep behavioral problem. A consultation with a "sleep coach" or a "sleep advisor" with no pediatric formation could delay the diagnoses of

any of these underlying diseases, with the aggravating situation of teaching the parents to ignore their child's cry, on occasion for prolonged periods of time (10).

There is abundant bibliography that confirms that different diseases can alter child's sleep in pediatrics but it is not described the precise incidence that shows the percentage of the consultations for sleep disorders which could be triggered by underlying diseases. To identify and solve these diseases is priority before starting the treatment of the behavioral sleep problem. The purpose of this investigation is to evaluate the frequency of the medical problems associated to the sleep disorders in kids from 0 to 36 months

Material and Method:

A cross sectional study in patients between 0 and 36 months old that visit spontaneously with their caregivers to a consultation or derived by their pediatrician with a diagnosis of sleep disorder, between 3/1/2010 and 6/20/2020.

It's a pediatric ambulatory office where the correspondent author, a pediatrician with 20 years of experience and who's orientation is sleep disorders sees patients with such problems. He sees a media of 200 consultations a year related to sleep disorders in the pediatric population. The diagnosis of the medical problem was found by way of clinical charts' revision. The diagnoses were defined as such:

Failure to thrive was defined after an exhaustive pediatric examination and the study of the history of weight and height considering pathological a fall in weight percentile sustained over time. In the case of patients with a diagnostic presumption of cow's milk protein allergy, it was confirmed by a pediatric gastroenterologist and the challenge test to the cow's milk protein. The diagnosis of reflux esophagitis was confirmed by a consultation with a pediatric gastroenterologist. Presumption of respiratory problems (oral breathing, adenoid hypertrophy, tonsillar hypertrophy) were confirmed by a consultation with a pediatric otolaryngologist. And the obesity diagnosis was made with anthropometry and confirmed by a consultation with a pediatric nutritionist.

The protocol was approved under the number 3391 of The Comite de Etica en Investigacion Clinica of the Centro de Estudios Infectologicos in Buenos Aires.

The redaction of this article has been done following the STROBE guide for cross sectional studies.

Statistical analysis

In the analysis of the descriptive statistics were described the continual numeric variables as a media with its measurement of dispersion (DS o IIQ 25-75%) according distribution. The categorical variables were reported as absolute or relative frequencies. To calculate the prevalence as numerator were used all the patients who presented medical problems and as denominator all the patients who consulted for sleep disorders. Also, the 95% CI was calculated.

For the specific prevalence in kids younger than 12 months old as numerator was used all the patients younger than 12 months old who presented medical problems and as denominator all the patients younger than 12 months old who consulted for sleep disorders. The 95%CI was calculated as well. To explore the associated factor to the sleep problems and medical problems we used a model of bivariate logistical regression, obtaining as magnitude measure an effect or an OR with its respective 95% CI. For the statistical analysis the software STATA 15 was used.

Results

A total of 664 pediatric patients were included, with an age media of 9.3 (IIQ 25-75% 6.8-18 months) of which 53.3% (354) were male. The reason to visit the doctor in order of frequency were 91.6% (608) because of waking up in the middle of the night, 3.5% (23) because of refusal to go sleep and the same percentage for high need baby. Colicky patients 1,36% (9) and nightmares or night terrors 0.15% (1).

Among the non- medical problems, the most frequent diagnosis was waking up in the middle of the night in the 80.6 % (463).

With 90 cases the prevalence of associated medical problems, was 13.5% (IC95% 11-16%).

In Table 1 the medical problems diagnosed by frequency order are resumed.

Table 1. Diagnoses of medical problems associated to sleep disorders (n=92).

Hunger *	31 (34.4%)
Esophagitis	24 (26.7%)
COW'S MILK ALLERGIES	22 (24.4%)
Atopic dermatitis	5 (5.6%)
Difficulty TO BREATH	4 (4.4%)
Obesity	4 (4.4%)
*absolute frequency (relative frequency)	

When compared in crude form (not adjusted), the groups of patients depending on if they presented or not, associated medical problems, we found that the patients who presented problems were YOUNGER than the ones who did not present them. (see Table 2). When calculating the specific prevalence in kids younger than 12 months old, IT increases to 20% (76/383 IC 95% 17-25)

Table 2. Basal features of the kids depending on if they present or not associated medical problems.

	Patients with no medical problems (n= 574)	Patients with medical problems (n= 90)	OR (IC95%)	p-value
Age in months	9.8 (7.4-18.5)	5.8 (4.6-7)	0.84 (0.79-0.89)	<0.001
Male sex	306 (53.3%)	48 (53.3%)	0.99 (0.63-1.5)	0.997
& median (IIQ25-75%), absolute frequency (relative frequency)				

Discussion

In this work we have seen that 13 out of 100 kids less than 3 years old have medical problems associated to sleep disorders. In kids younger than 12 months old the proportion is even higher and would even reach 20%. We did not have the possibility to compare our results with others because

this is the first investigation in children that shows the incidence of sleep disorders associated to medical problems. It is interesting because sleep disorders are a frequent problem in pediatrics and currently there is no discipline in charge exclusively for them, according to C.M. Johnson from the Department of Psychology, Central Michigan University (28) these patients are seen by general physicians, psychologists, pediatricians and other specialties.

According to D. Ophoff (25) in his revision "Sleep disorders during childhood: a practical review", the pediatricians should routinely screen for sleep and sleep disorders, given that is important to recognize and treat them correctly.

Jodi A Mindell in the investigation "Prevalence of Diagnosed Sleep Disorders in Pediatric Primary Care Practices" affirms: because sleep disorders are treatable when recognized, the results from this study suggest a significant need for additional education and support for primary care providers in the diagnosis and treatment of pediatric sleep disorders. (29)

According to C.M Johnson, parents are more likely to seek information about sleep from relatives, friends, or books and magazines than from their physician or from a psychologist (28)

Night awakenings can affect physically and emotionally the whole family. A work published in the Journal of Developmental & Behavioral Pediatrics showed that the attachment in the first year is related to the sleep patterns at 6 months old and kids with more awakenings had an insecure-avoidance attachment at 1 year of life (27)

Dr D. Ophoff reported how the lack of sleep can affect negatively medically, psychologically and developmentally in the child. Regarding physical health, there is an increase in the incidence of obesity (26) and regarding the emotional health of the family a work by Gray Gemo in 2009 reported that a home where a baby has frequent awakenings is associated to increase mother's depression and rupture of the marital relationship (27). There is also a growth in the incidence of child mistreatment, putting in danger in the most extreme cases to Shaken baby syndrome (30).

One of the most utilized interventions by the "sleep coaches" is to let the child cry it out so they auto control. It is well known how detrimental is to the short, median and long term to let the kids cry without attention (on occasion for prolonged periods of time) (11,12).

There is speculation that letting the child cry it out without attention, to a child who is hungry or in pain generates stress. Drs. Rene Spitz (35), Allan Shore (36) and David Bowlby (37) have deeply studied the effect of the lack of emotional contention in early infancy and the deleterious effect that this causes, with the possibility in the most extreme cases of anaclitic depression.

Due to the difficulties to study the effect of cry in children, there have been investigations in animals. When baby monkeys are separated for a few minutes from their mothers, there was observed an immediate increase in their plasma cortisol levels (33)

However, even though we don't know how long is the time a child can be exposed to this situation in order for the result being detrimental, it is really well known that stress is an activator of the hypothalamic-pituitary axis, resulting in an increase in the glucocorticoids, and those access the brain binding to receptors which influence the brain and behavioral development (34), leading to problems in learning, increased sensibility to drugs of abuse, anxiety and depression when adults (11-12)

If we consider that letting an infant to cry it out without attention generates stress, it is demonstrated that traumatic experiences in the first infancy correlate with measurable changes in the Central Nervous System.

In particular hippocampus atrophy and reduction in the volume of the amygdaline corpus. (13)

Given the fact that we have found an important percentage of kids with sleep disorders present medical problems causing pain and/or crying, being the most common: hunger, esophagitis, and cow's milk protein allergy, it is fundamental to solve them before starting with the behavioral sleep problem treatment, since letting them cry it out without attention and without the possibility of auto-control because of the pain, could generate disturbances in the short, medium and long run.

It stands out the lack of reports of these pathologies in the investigations regarding kids' sleep. In this work we have found an important percentage of kids with sleep disorders who present

medical problems that require a timely approach by a professional to arrive to an early diagnosis and adequate treatment, being the most common hunger, esophagitis and cow's milk protein allergy.

Conclusions

This investigation shows that 20% of kids less than a year old and 13,5% of the kids younger than 3 years old that consult because of a sleep problem, present a concomitant medical problem, hence they don't have the possibility of falling asleep without intervention of their care givers. It is important for the pediatricians to investigate sleep patterns for the opportune inquiry of entities that require treatment or follow up.

Conflict of interest: The investigators declare not to have conflict of interest.

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