

Summer Student Research Program
Project Description

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PROJECT TITLE (200 Characters max):

Sleep disorders in children with neurological disorders

HYPOTHESIS:

Sleep disorders are more prevalent in children with neurological disorders. There is an association between neurological disability and sleep disordered breathing.

PROJECT DESCRIPTION (Include design, methodology, data collection, techniques, data analysis to be employed and evaluation and interpretation methodology)

Title: Prevalence of Sleep Disorders in Children with Neurological Disorders

Protocol number: 0120060154

Co-Investigator:

The following individuals are considered to be co-investigators, but they do not play an active role at this stage of investigation.

Jayoung Pak, MD Department of Neurosciences and Neurology

Chitra Reddy, MD, Department of Pediatrics

Gary Eddy, MD, Matheny School and Hospital, Affiliated with NJMS

Kenneth Robey, PhD, Matheny School and Hospital, Affiliated with NJMS

Introduction

The impact of sleep disorders on the health of systemic organs is increasingly recognized. The risks of stroke, hypertension, diabetes, attention and memory deficits, and accidental injury are increased in individuals with sleep disorders. Neurologic diseases are often associated with various types of sleep disorders, especially pediatric neurologic diseases. Due to the key role of sleep for development and the impact of skeletal muscular development on sleep physiology, treatment of sleep disorders could have important outcome benefits both in systemic and neurologic development of the child.

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Awareness of sleep disorders in children with neurologic disorders is insufficient. Research on sleep disorders in children begins to emerge. There is limited knowledge of how prevalent of sleep disorders in various neurologic diseases in children. Didden et al¹ reported 16.1% of children with intellectual disability had sleep problems and daytime behavioral problems such as, headache, aggression, hyperactivity and non-compliance. Children with the more severe sleep problems exhibited more severe daytime behavioral problems. Zucconi and Bruni² reported sleep disorders in children with craniofacial deformity, epilepsy, blindness, neuromuscular diseases and cerebral palsy. Maganti et al.³ reported excessive daytime sleepiness and sleep complaints among children with epilepsy. Reports also showed that treatment of sleep disorders improved daytime behavior in children with ADHD or cerebral palsy⁴⁻⁵. Furthermore, it is well known that sleep disorders exacerbate epilepsy and improvement of sleep quality improves seizure control.

Research on prevalence of sleep disorders is based largely on questionnaire study. Chervin et al.⁶ standardized Pediatric Sleep Questionnaire (PSQ) that produced a valid and reliable scales for sleep disorders in children. This proposed study will adopt PSQ to conduct a survey of the prevalence of sleep disorders in children with epilepsy, cerebral palsy, autism, ADHD, or mental retardation. In addition, we will assess the impact of multiple disabilities, medication and other factors on sleep disorders in these children. Finally we will evaluate the potential interaction of sleep disorders with epilepsy by determining whether children with both sleep disorders and epilepsy have more intractable epilepsy than children with epilepsy alone, controlling other variables.

Reference:

1. Didden R., Korzilius H., van Overloop C., de Vries M. (2002). Sleep problems and daytime problem behaviours in children with intellectual disability *J Intellectual Disability Research* 49(7): 537-547.
2. Zucconi M, Bruni O. (2001) Sleep disorders in children with neurologic diseases *Seminar Pediatric Neurology* 8(4):258-275.
3. Maganti R., Hausman N., Koehn M., Sandok E., Glurish I., Mukesh BN (2006). Excessive daytime sleepiness and sleep complaints among children with epilepsy *Epilepsy and Behavior* 8:272-277.
4. Fuller McCarty S., Gaebler-Spira D., Harvey RL (2001) Improvement of sleep apnea in a patient with cerebral palsy *American J Physical Medicine and Rehabilitation* 80(7):540-542.
5. Pakyurek M, Gutkovich Z, Weintraub S. (2002) Reduced aggression in two inpatient children with the treatment of their sleep disorder *J Am Acad Child Adolesc Psychiatry.* 41:1025-1027
6. Chervin RD, Hedger K, Dillon JE et al. (2000) Pediatric sleep questionnaire (PSQ): validity and reliability of scales for sleep-disordered breathing, snoring, sleepiness, and behavioral problems. *Sleep Medicine* 1:21-32.

Procedures/Methods Design/Study Population:

This study will be carried out at two sites, one is UH and DOC ambulatory clinics including pediatric epilepsy clinic, general pediatric neurology clinic and pediatric clinic; the other is the inpatient and outpatient units of Matheny School and Hospital. Subjects will be recruited, based on inclusion criteria, during office visits while they are awaiting for meeting with physicians in all ambulatory setting. Caregivers and subjects will be interviewed for consent process in a private room at the clinic, and caregivers will be allowed in the private room for completion of the questionnaire or take the questionnaire home with mailing materials including postage.

Inclusion criteria:

- 1) Children of 2-18 years of age;

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- 2) Children who are healthy and free from developmental disorders;
- 3) Children with epilepsy, with or without other developmental disorders (such as mental retardation);
- 4) Children with cerebral palsy, with or without other developmental disorders;
- 5) Children with autism spectrum disorders;
- 6) Children with mental retardation without other developmental disorders (to assess the impact of the single factor of mental retardation on sleep disorders):
- 7) Children with ADHD without other developmental disorders.

Exclusion criteria:

Children with independent cranial facial deformity such as Robin syndrome, achondrioplasia, and respiratory disorders such as tracheomalacia, asthma, chronic lung diseases will be excluded.

Data Analysis:

The results of this study will be expressed frequency tally (all or none). The results of questions that involving semi-quantitative answers (such as how many times of night awakening) will be converted to degree of severity and expressed as frequency tally. ANOVA will be used for comparison of prevalence among groups. Chi square analysis will be use, where appropriate, to assess correlation between variables. If necessary, consultation with statistician will be made.

Reporting Results:

This study is at the stage of data analysis. The results will be reported by publishing an article in a medical journal.

SPONSOR'S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:

Siddiqui F., Walters A.S., **Ming X.**, and Chokroverty S. Sleep Disorders: Restless Leg Syndrome. Clinical Neurophysiology. 2007 Sep;118(9):1923-30.

Ming X, Gordon E, Kang N, Wagner GC. Use of Clonidine in Children with Autism Spectrum Disorders. Brain and Development Vol 30/7 pp 454-460, 2008

Ming X, Sun YM, Nachajon RV, Brimacombe, Walters AS. Increased Prevalence of Parasomnia in Children with Autism Spectrum Disorders. Clinical Medicine: Pediatrics. In press.

Ming X and Walters AS. Autism Spectrum Disorders, ADHD and Sleep Disorders. Current Opinions in Pulmonary Medicine. 2009 Aug 26. [Epub ahead of print]

IS THIS PROJECT SUPPORTED BY EXTRAMURAL FUNDS?

Yes or No

THIS PROJECT IS: Clinical Laboratory Behavioral Other

THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS

PENDING APPROVED IRB PROTOCOL # M 0120060154

THIS PROJECT IS SUITABLE FOR:

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UNDERGRADUATE STUDENTS ENTERING FRESHMAN
SOPHOMORES ALL STUDENTS X

THIS PROJECT IS WORK-STUDY: Yes or No X

**THIS PROJECT WILL BE POSTED DURING ACADEMIC YEAR
FOR INTERESTED VOLUNTEERS?:** Yes X or No

WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?

The student will learn how to conduct human subject clinical research and will be familiar with common sleep disorders and neurological disorders in children.