



CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

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Project Title
Comparing the Gender Differences in REM Sleep and the Possible Implications in Neurological Disease

Abstract

Objectives/Goals
Dreaming has fascinated us all over the ages. Dreaming occurs during REM (rapid eye movement) phase of sleep. There are some neurological diseases which are caused/intensified by a lack or surplus of REM sleep. There are differences in sleeping patterns, brain activity and potential neurological disease between the genders. This study aims to recognize the affect that gender has on REM sleep.

Methods/Materials
polysomnographic studies were conducted on 214 patients, 162 male and 52 female were examined for REM duration, BMI, age, and presence or absence of sleep apnea. Patients were divided into 4 groups based on severity of apnea. Data in each group was analyzed by calculating mean and t-test and $p < 0.05$ considered significant.

Results
men averaged higher time in REM (51.3 min) however they averaged younger age (38.5) and lower BMI (30.5). Women averaged shorter time in REM Sleep (31.7 min); however they averaged older ages (50 years) and higher BMIs (32.5). The difference between REM duration between men and women was statistically significant (probability $< .05$).

| Type | REM Sleep Duration | Probability Values |
|----------------------------|--------------------|--|
| Male No Apnea Avg. | 54.3 minutes | .0419 significantly different from females |
| Female No Apnea Avg. | 31.9 minutes | |
| Male Mild Apnea Avg. | 59.2 minutes | .0002 significantly different from females |
| Female Mild Apnea Avg. | 30.2 minutes | |
| Male Moderate Apnea Avg. | 55.2 minutes | .0183 significantly different from females |
| Female Moderate Apnea Avg. | 28.3 minutes | |
| Male Severe Apnea Avg. | 30.6 minutes | .1662 not significantly different from females |
| Female Severe Apnea Avg. | 1.9 minutes | |

Conclusions/Discussion
My hypothesis was correct: There are differences in REM sleep duration between the genders. If we can fully understand the brain chemical changes during REM, we could approach treating neurological diseases differently. Not only can this experiment be useful in approaching disorders, brain development, and diseases, but it can also be useful in determining our evolutionary development. Dreaming has been expressed in the history of mankind and its evolutionary purpose is still unknown. Exploration of REM sleep can help us discover our evolutionary past and predict our future.

Summary Statement
My project is a retrospective study on the gender differences in REM sleep duration in patients with varying severities of sleep apnea and the possible implications in neurological disease.

Help Received
sleep technician taught me how to identify sleep stages and conduct polysomnographs; Dr. Varma at Trika Medical allowed me to work in the lab and collect data from reports.