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THE INFLUENCE OF AGE AND GENDER ON THE LATENCY OF EYE MOVEMENT IN HEALTHY HUMANS

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Standard measures of sleep recordings give differing results depending on the gender and they constantly change with age. Sleep latency increases, delta sleep decreases, and sleep tend to be shorter in duration and fragmented in middle-aged and elderly adults. The deterioration of sleep is observed earlier in men. In the 1980s, new measures called the Latency of Eye Movement (LEM) and the Mean Latency of Eye Movement (M-LEM) were proposed. Previous studies have shown that untreated patients with endogenous depression had the LEM and M-LEM shortened and that both indices get prolonged during treatment with antidepressants. On the other side, alcoholics in the abstinence period have LEM and M-LEM twice as long as healthy controls. In this study we set out to compare LEM and M-LEM in healthy humans according to the gender and age. The subjects of the study were 80 healthy volunteers: 40 males and 40 females, who were divided into 4 groups: females and males, below and above 40 years of age. In contrast to standard measures, our study did not reveal any significant changes of LEM or M-LEM due to the gender or age.

Key words: age, gender, latency of eye movement, sleep

INTRODUCTION

At the present day, polysomnography provides a wide assessment of sleep-related anomalies and healthy human sleep patterns. Unfortunately, standard measures of sleep recordings usually differ between genders and they constantly change with age. These two factors cause certain difficulties in studying the influence of diseases or medications on sleep pattern.
Across the lifespan the amount of time spent in the delta sleep shortens and this type of sleep nearly disappears around the sixth decade of life. The same tendency, albeit less evident, is observed for REM sleep. Moreover, sleep latency increases and sleep tends to be not only shorter in duration but also fragmented in middle-aged and elderly adults. From the age of 40 the worsening of sleep efficacy speeds up. The deterioration of sleep is observed earlier in men (1-5).

In the mid-1980s, a new sleep measure called the Latency of Eye Movement (LEM) was proposed. It was defined as the time in seconds between the onset of REM sleep to the first eye movement in the REM period. The onset of REM period is recognized according to Rechtschaffen and Kales's criteria (6), i.e., the chin EMG drops to the lowest level of recording, EEG is of relatively low voltage, mixed-frequency, and the last rapid eye movements may occur. The rapid eye movement is recognized when both the activity in one of the EOG-channels is minimum 50 µV and the duration of the eye movement is shorter than its amplitude. LEM is measured for each REM period during the night (7, 8). There also was proposed a related measure called the Mean Latency of Eye Movement (M-LEM) that was defined as a mean value of the LEM for all REM periods registered during sleep in one night (7, 8).

Our previous studies have shown that untreated patients with endogenous depression have both LEM and M-LEM shortened (7, 9). On the other side, alcoholics in the abstinence period, either males or females, have been found to have LEM and M-LEM twice as long as healthy controls (10). In yet other studies the influence of a single dose of mianserine or ipsapirone on LEM and M-LEM in healthy males and in patients suffering from depression during amitryptyline treatment has been analyzed. It turned out that the above antidepressants prolong LEM and M-LEM, the effect of ipsapirone being more pronounced (11-14).

In the present study we were interested in the possible differences in the LEM and M-LEM depending on the gender and age of normal subjects. We addressed the issue by comparing both indices in healthy male and female subjects stratified in two age groups: below and over 40.

MATERIAL AND METHODS

The study was approved by a local Ethics Committee and each subject gave his informed consent prior to the investigation. Polysomnographic sleep recordings were obtained from 80 healthy volunteers: 40 males of a mean age of 38.6 years ±14.2 (SD) (range: 24-59) and 40 females of a mean age of 38.3 ±14.9 (range: 22-59).

The sleep examination were performed according to standard criteria and procedures established in the sleep laboratory at the Institute of Psychiatry and Neurology in Warsaw. Each subject slept in the laboratory twice. The first night served for adaptation to the sleep laboratory conditions. The second night was considered as a baseline for the subsequent tests. Sleep recordings were registered with the use of a polysomnograph (Medelec 1A97; U.K.) with the following technical features: paper speed 15mm/s, calibrations 50 uV/10mm for EEG and electrooculogram, 20uV/10mm for electromyogram. The time-dependent EEG and EOG was approximately 0.3 s, and
for EMG 0.15 s; filters for EEG and EOG were 30 Hz and for EMG 70 Hz. Night sleep recordings were scheduled for 8 h. The electrode arrangement and the recordings' coding were done according to standard criteria (6).

The recordings were evaluated and LEM (in seconds) measured blindly by one of us (WJ) without the knowledge of the subject's age and gender. REM periods were identified according to previously described methods. For each REM period during the night, the LEM was evaluated (LEM1, LEM2, etc.) and then the M-LEM was calculated.

The subjects were divided into 4 groups: females below and above 40 years, and males in the same way. For each group, mean values ±SD were calculated for the parameters studied. Differences between the groups were assessed with one-way ANOVA and a t-test. Additionally, linear regression analysis was performed to correlate the data for LEM for 4 REM periods during the night and for M-LEM with age, for both male and female subjects.

RESULTS

The results of the data analysis are displayed in the tables below. There were no statistically significant differences in LEM or M-LEM between the entire groups of male and female subjects, analyzed irrespective of age (Table 1), or in either gender below and above the age of 40 (Table 2). Likewise, no correlation

Table 1. Latency of Eye Movement (LEM) and the Mean Latency of Eye Movement (M-LEM) in healthy males and females.

<table>
<thead>
<tr>
<th></th>
<th>Males (n=40)</th>
<th>Females (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEM1</td>
<td>42.0 ±46.0</td>
<td>38.5 ±40.3</td>
</tr>
<tr>
<td>LEM2</td>
<td>29.1 ±29.2</td>
<td>39.8 ±38.0</td>
</tr>
<tr>
<td>LEM3</td>
<td>39.6 ±33.0</td>
<td>48.8 ±44.7</td>
</tr>
<tr>
<td>LEM4</td>
<td>34.9 ±29.4</td>
<td>41.0 ±38.7</td>
</tr>
<tr>
<td>M-LEM</td>
<td>36.1 ±18.0</td>
<td>45.4 ±32.6</td>
</tr>
</tbody>
</table>

Values are mean ±SD latencies in seconds. There were no differences between the gender groups.

Table 2. Latency of Eye Movement (LEM) and Mean Latency of Eye Movement (M-LEM) in male and female subjects aged below 40 and over 40.

<table>
<thead>
<tr>
<th></th>
<th>Males aged &lt;40 (n=18)</th>
<th>Males aged &gt;40 (n=22)</th>
<th>Females aged &lt;40 (n=20)</th>
<th>Females aged &gt;40 (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEM1</td>
<td>27.0 ±21.0</td>
<td>55.5 ±56.0</td>
<td>38.3 ±30.3</td>
<td>38.5 ±49.1</td>
</tr>
<tr>
<td>LEM2</td>
<td>28.7 ±24.3</td>
<td>29.4 ±33.3</td>
<td>37.6 ±41.0</td>
<td>41.8 ±35.9</td>
</tr>
<tr>
<td>LEM3</td>
<td>37.2 ±31.0</td>
<td>41.3 ±35.2</td>
<td>41.0 ±35.9</td>
<td>56.3 ±51.5</td>
</tr>
<tr>
<td>LEM4</td>
<td>36.1 ±31.8</td>
<td>34.0 ±28.7</td>
<td>38.6 ±43.1</td>
<td>42.4 ±37.2</td>
</tr>
<tr>
<td>M-LEM</td>
<td>32.9 ±14.5</td>
<td>38.6 ±20.3</td>
<td>40.4 ±22.9</td>
<td>50.3 ±40.1</td>
</tr>
</tbody>
</table>

Values are mean ±SD latencies in seconds. There were no differences between the gender and age groups.
between LEM and M-LEM values and age was revealed in the studied age groups of both genders.

**DISCUSSION**

In contrast to standard measures, for instance, total sleep time, sleep latency, delta sleep, REM sleep, awaking time within sleep, our study did not reveal any significant changes in LEM or M-LEM with respect to the age or gender of healthy subjects. The earlier studies that showed a shortening of LEM or M-LEM in depression and a lengthening of both measures after treatment with antidepressants (7-14) have proven that these indices are quite sensitive and might be useful tools in the assessment of sleep disturbances or in psychopharmacological studies. The present study puts weight on the pathophysiological meaning of any possibly noted changes in these indices by showing that such changes could not be due to the age or gender of the subjects studied.

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**REFERENCES**


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