DISTINGUISHING BETWEEN TRANSCENDENTAL MEDITATION, SLEEP AND OTHER FORMS OF REST ACCORDING TO ELECTROPHYSIOLOGICAL CRITERIA

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A quantitative meta-analysis of 11 studies indicates that the state of restful alertness produced through the practice of the Transcendental Meditation technique is clearly distinct from napping and sleep according to EEG criteria.—EDITORS

Is Transcendental Meditation (TM) distinct from sleep? Our EEG study showed significantly more wakefulness and less sleep during TM than napping sessions in the same subjects. A quantitative meta-analysis of the 11 available EEG studies also indicated less sleep during TM than napping.

Maharishi Mahesh Yogi (1969) predicts that during the Transcendental Meditation (TM) program, the mind experiences a fourth major state of consciousness, termed "transcendental consciousness." He describes transcendental consciousness as a unique state of "restful alertness" that is psychophysically distinct from the ordinary states of waking, dreaming, and sleeping. In our psychophysiological study, subjects served as their own controls (n = 5) and participated in one TM session and one napping control session at the same time of day, but on different days and in random order. EEG analysis showed a significant difference in the distribution of 4 EEG stages during TM and napping (F_{3,20} = 5.93, p < .005), with more waking (especially high amplitude alpha) and less sleep stage 2 during TM than napping.

In an earlier study, Pagano et al.'s 5 subjects slept more than our subjects during the TM technique (see Table 1), but they also spent considerably less time asleep during TM than during napping sessions. However, their quantitative analysis (which pooled across EEG stages and 4 trials/subject) lacked sufficient statistical power to detect the presence of this large effect. More powerful reanalysis of their data (taking advantage of their repeated trials) revealed a significant difference in EEG stage distributions between TM and napping in their subjects (F_{3,30} = 11.67, p < .002), with more wakefulness and less sleep stage 2 during the TM technique.

A statistical meta-analysis of the 11 available independent studies reporting percentage EEG sleep also indicated significantly more wakefulness (F_{19} = 38.0, p < .0001) and less sleep stages 2-4 (F_{19} = 44.1, p < .0001) in TM than during napping in the two studies for which napping controls were available (see Table 1).

Thus, according to standard EEG criteria the TM technique is clearly different from napping. It should be noted, however, that if an individual is unduly fatigued, when his awareness settles down during the TM technique, this fatigue may be normalized in the nervous system through sleep (Wallace, 1986). This would account for the occasional occurrence of drowsiness or sleep during TM practice. Further, it should be pointed out that EEG sleep criteria were not originally devised to assess the experience of pure consciousness during the TM technique. Other indicators—such as EEG coherence and respiratory suspensions—have been shown to more sensitively identify periods of pure consciousness during TM practice (e.g., Badawi, Wallace, Orme-Johnson, Rouzeré, 1984; Farrow & Hebert, 1982).

The current study demonstrates that application of statistical meta-analysis is an effective analytic tool for
Table 1
Percentage of time spent in each EEG stage during the TM technique averaged across subjects in different studies.

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Age</th>
<th>Yrs. of TM</th>
<th>Trials</th>
<th>TM session min.</th>
<th>W</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger et al. (1975)</td>
<td>8</td>
<td>20-29</td>
<td>3</td>
<td>4</td>
<td>40</td>
<td>1</td>
<td>1</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Pagano et al. (1976)</td>
<td>78</td>
<td>18-62</td>
<td>4.7</td>
<td>1-5</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hebert &amp; Lehmann (1977)</td>
<td>78</td>
<td>18-62</td>
<td>4.7</td>
<td>1-5</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Jevning et al. (1978) Sample 1</td>
<td>15</td>
<td>22-29</td>
<td>3-5</td>
<td>1</td>
<td>40</td>
<td>70</td>
<td>22</td>
<td>8''</td>
<td>0</td>
</tr>
<tr>
<td>Jevning et al. (1978) Sample 2</td>
<td>15</td>
<td>20-27</td>
<td>0.3</td>
<td>1</td>
<td>20</td>
<td>72</td>
<td>19</td>
<td>9''</td>
<td>0</td>
</tr>
<tr>
<td>Orme-Johnson et al. (1979)</td>
<td>35</td>
<td>18-28</td>
<td>3.7</td>
<td>3</td>
<td>30</td>
<td>78</td>
<td>20</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Warrenberg et al. (1980)</td>
<td>9</td>
<td>x=30</td>
<td>3.4</td>
<td>2</td>
<td>13-15</td>
<td>77</td>
<td>21</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Stigsby et al. (1981)</td>
<td>14</td>
<td>22-60</td>
<td>2-8</td>
<td>1</td>
<td>--</td>
<td>100''</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Jevning et al. (1982)</td>
<td>42</td>
<td>25-35</td>
<td>4-5</td>
<td>1</td>
<td>45</td>
<td>85</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Jevning et al. (1985)</td>
<td>30</td>
<td>21-34</td>
<td>6-10</td>
<td>1</td>
<td>45</td>
<td>90</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Alexander et al. (1986)</td>
<td>5</td>
<td>19-28</td>
<td>3-8</td>
<td>1</td>
<td>27</td>
<td>80</td>
<td>14</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

* Percentages may not sum to 100 in a given study because of rounding error or nonscorable epochs due to movement time or atypical patterns observed.

** Including scoring of stage 3; less than 1% of stage 3 was observed (Jevning, 1980, personal communication).

*** Stigsby et al. (1981) distinguished between drowsiness (stage Waking-1) and sleep onset (stage 1); it is possible that a small percentage of Stigsby et al.'s W would have been classified as stage 1 by other researchers.

quantifying differences between the TM technique and rest when results from numerous studies can be combined. Recent use of this statistical procedure by other investigators indicates greater reduction of somatic arousal during TM than during resting with eyes closed (Dillbeck & Orme-Johnson, 1987), and lower trait anxiety (Eppeley, Abrams, & Shear, in press) after TM than after other forms of meditation or stylized relaxation.

REFERENCES


