Introducing Mindfulness Based Relaxation Exercise to Preclinical Medical Students:

Student’s perception and its effect on Short Term Memory and Deep Sleep

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Background

(Significance of the study)
Mindfulness:

- Mindfulness is
  - living in the present.
  - intentionally paying attention to whatever is happening inside and outside the body.
  - being aware and awake in every moment of life.

- Default mode of brain
  - occurs when there is no mindfulness.
  - mind chatter, mind wondering, dwelling on the past and worry, judgment and criticism about the future
  - linked to mental health such as stress, anxiety, depression, sorrow, regret etc.
Heavy Stress imposing on Medical students

- Stress, anxiety, depression, sorrow, regret are common among medical students

- Medical Students are under heavy stress and burnout throughout their Course
  - Barikani A. 2007
  - Kirti Sharma. 2016
Mindfulness program are introduced in the school/universities and proved to be effective in managing stress in medical students:

- Benson H. 1975
- Paul G, Elam B, Verhulst SJ. 2007
- Orsatti M. 2010
Mindfulness program around the world to manage stress and learn to relax

A Quiet Time Program in a public school in San Francisco
University of California (San Diego) Center for Mindfulness offer a broad range of Mindfulness-based programs.
Kindergarten school children doing mindfulness in Mind-Up program in Hermosa Beach school California USA.
Purpose of this Study
(Objectives)
To:

- Introduce Mindfulness Based Relaxation Exercise (MBRE) to Preclinical Medical Students
- Determine the effect of MBRE on Short-Term Memory and Deep Sleep.
Methods
Study Design

- Prospective Cohort Study

- Twenty six students (12 male; 14 Female) were randomly selected from Year 1 and Year 2 MBBS Program.

- Thirty minutes/day of MBRE for 14 days at 4:30pm when all classes were over.

- Short Term Memory Tests (Words, Picture & Shape Recall Tests) were done before and after 14 days.

- Deep Sleep (as the percentage of total sleep duration) was measured using Smart Bracelet Wrist Band before and after 14 days of MBRE by the method called 'Actigraphy'.

- Students Perception was asked by self-administered questionnaire & scored by Likert-Scale

- SPSS version 21 was used for analysing data by paired t Test.
Mindfulness Based Relaxation Exercise (MBRE)

- Mindfulness Based Relaxation Exercise is:
  - Sitting upright position with legs folded, upright body, trunk and head, right hand on the left putting on the lap and eyes closing.
  - Focus and concentrate the mind on both nostrils upon breathing.
  - Observe Breathing-In by focusing the mind on the point of touching by entering air into the nostrils.
  - To say 'Breathing-In' during the process in the mind.
Mindfulness Based Relaxation Exercise (MBRE)

- Mindfulness Based Relaxation Exercise is:
  - Observe Breathing-Out by focusing the mind on the point of touching by leaving air out of the nostrils.
  - To say 'Breathing-Out' in the mind during the process.
  - Make fully aware of the cessation of respiration between one 'Breathing-In' and 'Breathing-Out'.
  - To say 'Relax' in the mind during the interval of Breathing-In' and 'Breathing-out'.
  - Keep on the 'Breathing-In', 'Breathing-Out' and 'Relax' for 30 minutes with the start and end timer chime.
**Short Term Memory Test**
(Word recall)

**Pre Test**

<table>
<thead>
<tr>
<th>Tree</th>
<th>Wardrobe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Caterpillar</td>
</tr>
<tr>
<td>Face</td>
<td>Garden</td>
</tr>
<tr>
<td>Pipe</td>
<td>Treacle</td>
</tr>
<tr>
<td>Clock</td>
<td>Picture</td>
</tr>
<tr>
<td>Mouse</td>
<td>Harness</td>
</tr>
<tr>
<td>Engine</td>
<td>Sleep</td>
</tr>
<tr>
<td>Planet</td>
<td>Apple</td>
</tr>
<tr>
<td>Thunder</td>
<td>Ocean</td>
</tr>
<tr>
<td>Necklace</td>
<td>Book</td>
</tr>
</tbody>
</table>

**Post Test**

<table>
<thead>
<tr>
<th>Momentum</th>
<th>Draw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tap</td>
<td>Butterfly</td>
</tr>
<tr>
<td>Leaf</td>
<td>Flower</td>
</tr>
<tr>
<td>Schedule</td>
<td>Jam</td>
</tr>
<tr>
<td>Rain</td>
<td>Portrait</td>
</tr>
<tr>
<td>Cat</td>
<td>Strap</td>
</tr>
<tr>
<td>Earth</td>
<td>Orange</td>
</tr>
<tr>
<td>Nose</td>
<td>Continent</td>
</tr>
<tr>
<td>Sky</td>
<td>Paper</td>
</tr>
<tr>
<td>Watch</td>
<td>Snooze</td>
</tr>
</tbody>
</table>

- Three minutes to watch on the screen
- Write down as many as remember
Short Term Memory Test
(Picture recall)

Pre Test

- Three minutes to watch on the screen
- Write down as many as remember

Post Test
Short Term Memory Test
Shape and Number recall

Pre Test

Post Test
## Regarding the Method:

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It was not difficult for me to follow the steps of actions as instructed.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>I felt the method of this exercise is practical and applicable to me.</td>
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<tr>
<td>3</td>
<td>This method gave me the relaxation of my mind and body.</td>
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</tbody>
</table>

## Regarding the Timing:

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<thead>
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<tbody>
<tr>
<td>4</td>
<td>Afternoon 4:30pm, when all the classes are done, was the appropriate time to do the exercise at Faculty.</td>
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## Regarding the duration of Exercise:

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</thead>
<tbody>
<tr>
<td>5</td>
<td>Thirty minutes of exercise per session was appropriate to achieve the intended purpose of relaxation effect.</td>
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</table>

## Regarding the Venue:

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<thead>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>The room for the exercise was free from disturbances.</td>
<td></td>
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</tbody>
</table>

## Regarding your experience:

During the exercise,

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<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>I achieved the state of relaxation at the start of the exercise.</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>I achieved the state of relaxation at the end of 30 minutes.</td>
<td></td>
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<tr>
<td>9</td>
<td>I changed my position less than three times during the exercise.</td>
<td></td>
<td></td>
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<tr>
<td>10</td>
<td>I felt the sense of pleasure during the exercise.</td>
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</table>

## Regarding future practice:

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</thead>
<tbody>
<tr>
<td>11</td>
<td>I will continue the practice of MBRE myself in future.</td>
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<td></td>
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</tr>
<tr>
<td>12</td>
<td>I will suggest my friends to practice MBRE.</td>
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<tr>
<td>13</td>
<td>I believe the state of mindfulness is crucial for my study and for my future success.</td>
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</tbody>
</table>
Smart Bracelet Wrist Band for monitoring Deep Sleep

- Motion detector Tri-Axil Accelerometer was used to monitor deep sleep
- Based on measuring the bodily movement detected during the sleep
- Effective for quantifying sleep quality

Yunyoung Nam, Yeeseok Kim, Jinseok Lee 2016.
- Sleep Monitoring Based on a Tri-Axial Accelerometer and a Pressure Sensor. *Sensor (Basel):*(5) 750-761
Actigraphy

- Measuring deep sleep by this sensor is called ‘Actigraphy’.
- Used for at least 30 years to study sleep-wake pattern
- Shows reasonable validity and reliability
- Comparable to that of Polysomnography, a gold standard method for measurement of sleep quality
  - Sadeh A, Sherkey KM, Carskadon MA. 1994
  - Sadeh A, Hauri PJ, Kripke DF, Lavie P. 1995
Results & Discussion
Student’s Perception on MBRE

- Not difficult: 69.6% Agree, 26% Not agree
- Applicable: 87% Agree
- Gives relaxation: 60.8% Agree
- Correct Timing: 78.3% Agree
- Achieved relaxation at start: 43.4% Agree, 26% Not agree
- Felt sense of pleasure: 43.4% Agree, 26% Not agree
- Will continue MBRE: 69.6% Agree, 26% Not agree
- Will suggest to friends: 73.9% Agree, 26% Not agree
- Mindfulness is crucial for study: 82.6% Agree, 26% Not agree
Students Perception

- Not difficult to practice............... 69.6%
- Method was practical & applicable...... 87.0%
- Method gave relaxation................ 60.8%
- Sense of relaxation at the start..........26.0%
- Sense of relaxation at the end............43.4%
- Will continue MBRE......................69.6%
- Suggest to friends........................73.9%
- Mindfulness is crucial for the study......82.6%
Pre and Post Mean and SD of Short Term Memory and Deep Sleep percentage

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th></th>
<th>Post</th>
<th></th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Short Term Memory</td>
<td>41.82</td>
<td>7.13</td>
<td>43.39</td>
<td>6.13</td>
<td>0.018</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep sleep(%)</td>
<td>51.99</td>
<td>11.12</td>
<td>56.56</td>
<td>7.66</td>
<td>0.039</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
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</tbody>
</table>
Short Term Memory

- Short Term Memory was improved at the end of 14 days (p < 0.05)

- Even a brief mindfulness exercise was shown to improve short term memory

- Mindfulness reduced mind wandering and produced more focussing
Deep Sleep

- Stages of Sleep
  - Stage 1, 2, 3, 4 (NREM sleep) & REM sleep
  - Stage 3 & 4 are combined together and known as Deep Sleep or Slow wave sleep or N3
  - Schulz H (2011)

- Deep sleep is the time of nearly complete disengagement from environment
  - Psychology Today: [https://www.psychologytoday.com/basic/sleep](https://www.psychologytoday.com/basic/sleep)

- Hear rate & Breathing slows, muscle relax to a point of almost no movement, basic for measuring by ‘Actigraphy’.
Impact of Deep Sleep on memory

- Percentage of Deep sleep increased after 14 days of MBRE (p< 0.039)

- Deep sleep/Slow wave sleep has impact on memory
  - memory was improved by increasing deep sleep in age-related decline in memory
  - played role in memory encoding and memory consolidation
  - down scale synaptic strength to baseline level after learning process
Conclusion

- Students experienced Mindfulness Based Relaxation Exercise as:
  - applicable
  - easy to practice
  - crucial for their study
  - gave relaxation to them.

- Short Term memory was improved and increased in percentage of Deep sleep was found after 14 days practice on MBRE
thank you!
References:


10. Black, D. S. 2015 Mindfulness Meditation and Improvement in Sleep Quality and Daytime Impairment Among Older Adults With Sleep Disturbance: A Randomized Clinical Trial. JAMA Internal Medicine.:175(4): 494-501


12. Yunyoung Nam, Yeosock Kim, Jinseok Lee 2016. Sleep Monitoring Based on a Tri-Axial Accelerometer and a Pressure Sensor. Sensor (Basel):(5) 750-761

References:


17. Psychology Today. https://www.psychologytoday.com/basic/sleep


