Introducing Mindfulness Based Relaxation Exercise to Preclinical Medical Students:

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

Maung Maung Aye.
Chin Jin Han.

MAHSA University, Kuala Lumpur, Malaysia

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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 out side 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

    - Guthrie, E.A et al. 1995, 1998
    - Barikani A. 2007
    - Kirti Sharma. 2016
    - Fares J et al 2016

Mindfulness program are introduced in the school/universities and proved to be effective in managing stress in medical students:

- Benson H. 1975
- Shapiro SL, Schwartz GE, Bonner G. 1998
- Paul G, Elam B, Verhulst SJ. 2007
- Orsatti M. 2010
- Rosenzweig S et al 2003.

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.

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.
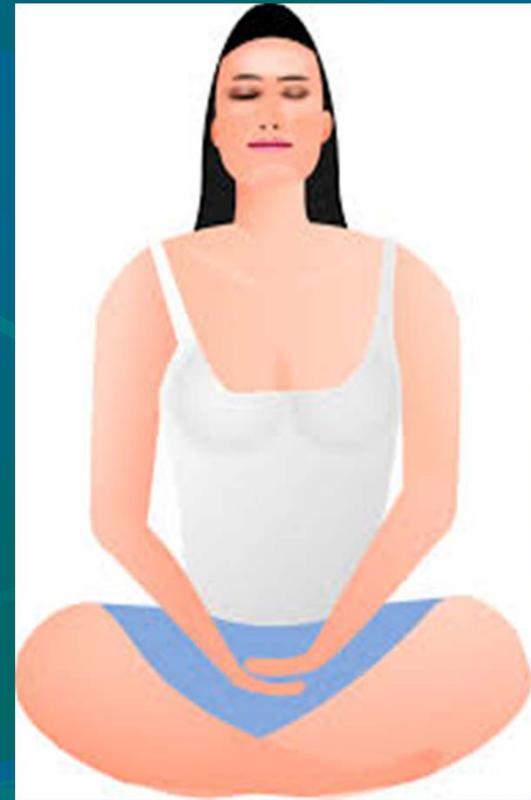
Short Term Memory Test
(Word recall)

Pre Test

Tree	Wardrobe
Time	Caterpillar
Face	Garden
Pipe	Treacle
Clock	Picture
Mouse	Harness
Engine	Sleep
Planet	Apple
Thunder	Ocean
Necklace	Book

Post Test

Momentum	Draw
Tap	Butterfly
Leaf	Flower
Schedule	Jam
Rain	Portrait
Cat	Strap
Earth	Orange
Nose	Continent
Sky	Paper
Watch	Snooze

➢ **Three minutes to watch on the screen**

➢ **Write down as many as remember**

Short Term Memory Test
(Picture recall)

Pre Test

Post Test

➢ **Three minutes to watch on the screen**

➢ **Write down as many as remember**

Short Term Memory Test
Shape and Number recall

Pre Test

Post Test
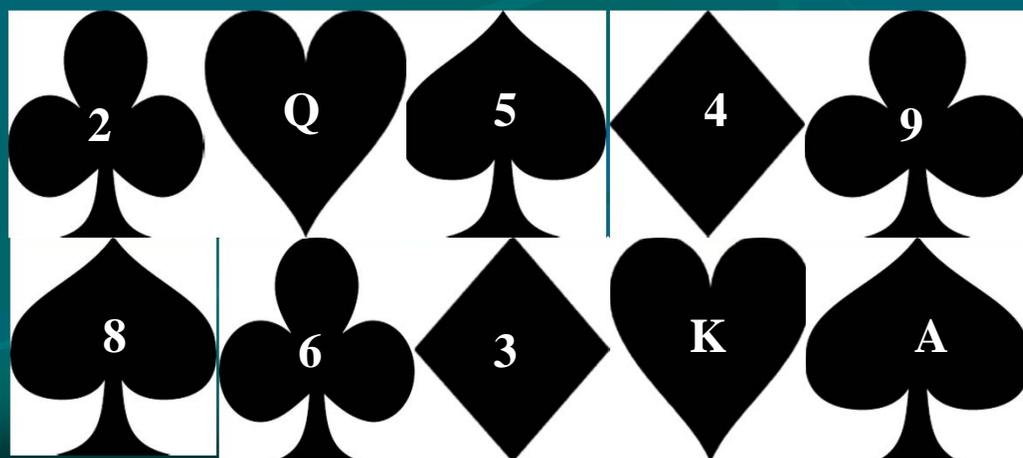
Regarding the Method:	Strongly disagree	Disagree	Not Sure	Agree	Strongly agree
1 It was not difficult for me to follow the steps of actions as instructed.					
2 I felt the method of this exercise is practical and applicable to me.					
3 This method gave me the relaxation of my mind and body.					
Regarding the Timing:					
4 Afternoon 4:30pm, when all the classes are done, was the appropriate time to do the exercise at Faculty.					
Regarding the duration of Exercise:					
5 Thirty minutes of exercise per session was appropriate to achieve the intended purpose of relaxation effect.					
Regarding the Venue:					
6 The room for the exercise was free from disturbances.					
Regarding your experience: During the exercise,					
7 I achieved the state of relaxation at the start of the exercise.					
8 I achieved the state of relaxation at the end of 30 minutes.					
9 I changed my position less than three times during the exercise.					
10 I felt the sense of pleasure during the exercise.					
Regarding future practice:					
11 I will continue the practice of MBRE myself in future.					
12 I will suggest my friends to practice MBRE.					
13 I believe the state of mindfulness is crucial for my study and for my future success.					

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, Yeesock 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
   - Schulz H. 2008.

Results & Discussion

Student's Perception on MBRE

Percentage vs Student's Perception

- Not difficult: Agree 69.6
- Applicable: Agree 87
- Gives relaxation: Agree 60.8
- Correct Timing: Agree 78.3
- Achieved relaxation at start: Agree 26
- Achieved relaxation at 30 minutes: Agree 43.4
- Felt sense of pleasure: Agree 43.4
- Will continue MBRE: Agree 69.6
- Will suggest to friends: Agree 73.9
- Mindfulness is crucial for study: Agree 82.6
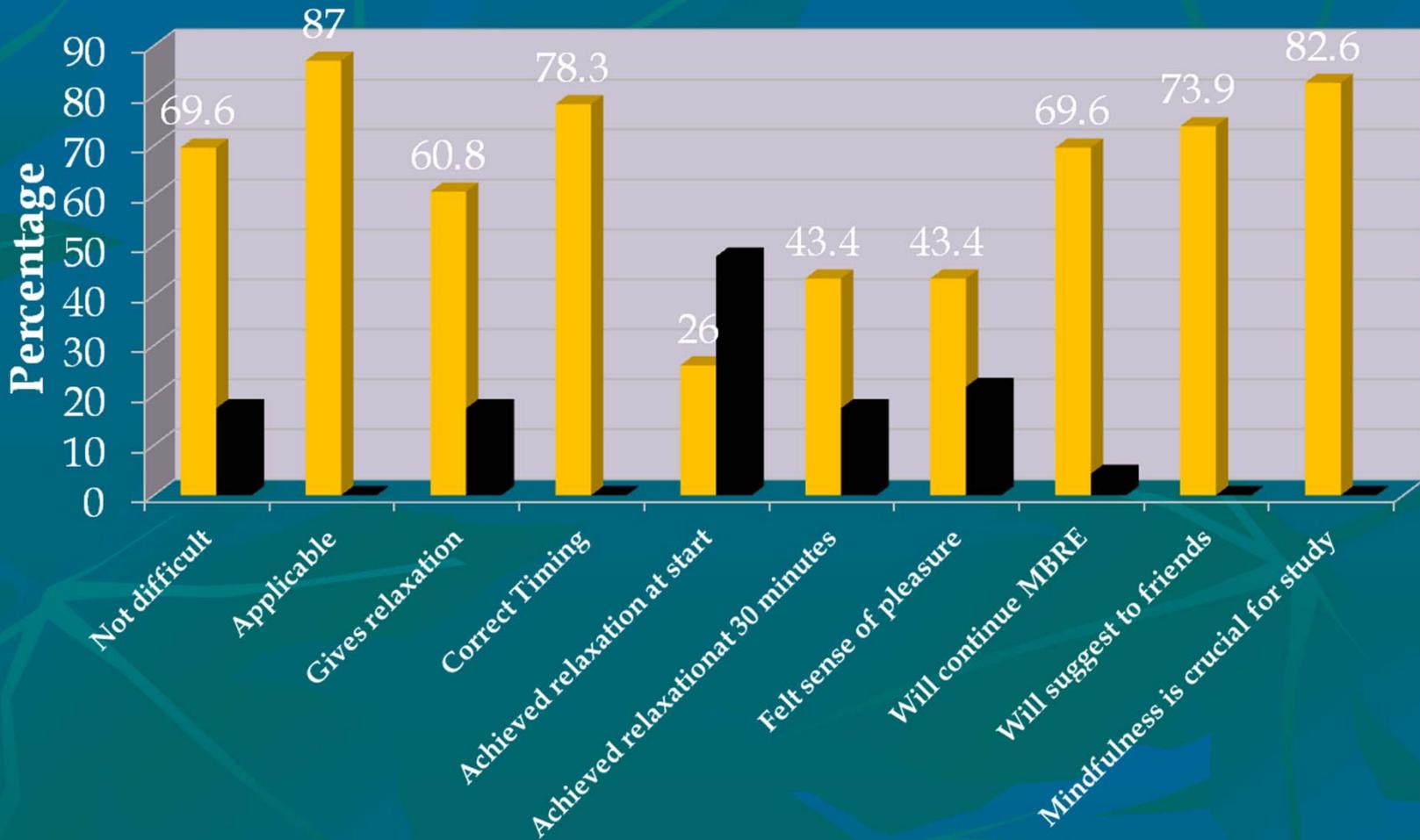
Legend: ■ Agree ■ Not agree

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

	Pre		Post		
	Mean	SD	Mean	SD	p value
Short Term Memory (n=26)	41.82	7.13	43.39	6.13	0.018
Deep sleep(%) (n=26)	51.99	11.12	56.56	7.66	0.039

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
    - Bonamo KK, Legersk JP, Thomas KB (2015)

- Mindfulness reduced mind wandering and produced more focussing
    - Mrazek MD, Franklin MS, Phillip DT, Baird B & Schooler JW (2013)

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

- 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
    - Walker M P; 2008, 2009.
  - down scale synaptic strength to baseline level after learning process
    - Tonio G, Cirelli C; 2006.

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

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