

Original Article

Assessment of Attention of Medical Undergraduates at Different time Intervals of a Day

P. Parameshwari^{1*}, P. Getrude Banumathi², S. Sujatha³

^{1,2}Associate Professor, ³Assistant Professor, Department of Community Medicine, Chengalpattu Medical College, Chengalpattu - 603 001, India.

Corresponding author - Dr. P. Parameshwari (paramesh1584@gmail.com)

Associate Professor

Department of Community Medicine,

Chengalpattu Medical College,

Chengalpattu-603002.

Chettinad Health City Medical Journal 2021; 10(3): 136 - 141

DOI: [https://doi.org/10.36503/chcmj10\(3\)-04](https://doi.org/10.36503/chcmj10(3)-04)

Abstract

Background: Attention in the classroom is the first step in learning process. Attention provides reinforcement of sensory and cognitive process for maximum clarity and understanding. Lack of attention may affect the students learning ability and academic performance.

Methodology: To assess the different types of attention (sustained, focused and divided attention) among the first-year medical undergraduate at Chengalpattu medical college at different sessions -morning, pre-lunch, post-lunch and evening session of a day and to compare the scores obtained at different sessions. We used a subset of attention test materials matching the unfamiliar object, number cancellation test, digit symbol substitution test, cross word test, colour trail test, quick attention test, random word test, triads test in different time intervals. Totally 100 students participated in the study, and their score was assessed. Mean and standard deviation calculated for continuous variable. T-test was performed to compare the attention scores between males and females.

Results: Female students are more attentive in the morning and pre-lunch and males in post-lunch and evening sessions. Sustained attention among the students is higher in the morning and post-lunch sessions; focused attention is higher in morning and evening sessions; divided attention is higher in morning and evening sessions.

Conclusion: Female subjects are more attentive at the start of the day and male subjects tend to be more attentive at the end of the day. This study could be useful in both educational institutions and in-office going population, both of which come under the country's active population.

Introduction

Medical Education stands at the pinnacle of the most demanding academic curriculum. Despite the rapid advancements in the methods of medical education, students are still required to memorize a significant amount of information during the academic years. This requires a high level of cognitive ability to retain that knowledge.¹

Attention is an important cognitive function that affects students learning ability and academic performance. Our orientation reflexes help us to determine which events in our environment need to be attended to a process that aids the inability to listen, learn and implement in our medical field. Attention allows students to focus on information and avoid distractions to focus on and complete their specific tasks. Attention has an important role

in the students' understanding of the nature and development of scientific knowledge and participating productively in scientific practices.

Attention is a somewhat nebulous and complex construct in general parlance. It refers to a variety of components; These are "initiation or focusing", "sustaining attention or vigilance", "inhibiting responses to irrelevant stimuli or selective attention", "shifting attention".

Attention is directly related to working memory. As a cognitive resource, attention helps to deal with various tasks in the working memory system.² This present study focused on assessing the attention in the different periods among undergraduate medical students. Because, Attention is considered as a complex function which involves a person's skill to focus on a particular stimulus excluding other

stimulus from the environment and internal distractions.³

The shifting of attention is considered to reflect the need for flexibility and adaptation of various elements of attention. At the same time, components of attention are impacted by the overall arousal state of the individual. Previous study has shown that attention and working memory are closely related to the students' learning ability and performance (). Issues surrounding students' attention is currently attracting more and more attention as research topic.^{4,5} Present study also becoming one among others.

The focus of attention returns to the meditation object through attention switching/cognitive flexibility. This mental ability is measured through tasks that require respondents to shift their attentional focus between different stimulus properties in order to succeed. The other two reasons for incorporating mindfulness into higher education are the management of academic-related stress and personal growth.⁶

The aim and objectives of this study was to assess the attention of undergraduates of MBBS (first year) at different time intervals of a day through to compare the scores obtained by the study subjects based on their attention levels at different sessions.

Materials and methods

Participants and ethical approval

A cross sectional study was conducted among 100 first year undergraduate medical students at Chengalpattu government medical college between February to March 2017 to assess the different type of attention at different time intervals. This study was approved by the institutional ethical committee of Chengalpattu medical college.

We conducted different types of test to assess their different types of attention such as focused, divided, sustained attention at different time period namely morning, pre-lunch, post-lunch, and evening.

Test construction and Evaluation

Test of assessment includes a range of subtest materials based on simulation and cognitive activities distributes among the students and evaluated their attention through given scores on each test by given time period. In general, interpretation and evaluation of entire test takes 30 minutes. All instruction was easy to understand and example tasks are shown in figure 1.

Procedure and assessment

Map cancellation

Students were instructed to strike out 4 numbers for example 2,5,7,9 in the test material which consist of 50 lines of jumbled numbers within the fixed time limit. This test used to assess the sustained attention. This test was conducted on morning and post-lunch. The total score given for the test was 600 in 4 minutes of time.

Digit symbol substitution test

This test used to assess the sustained attention which was conducted on pre-lunch and evening. This test consists of an array of nine numbers, each paired with a symbol. The students were asked to substitute the correct symbol as quick as possible in following rows consisting of nine numbers alone. The score was calculated by counting the number of correct responses in the fixed time. This was considered a powerful test of cognitive function because it places a high demand on speed, attention, visual scanning and memory. The total score given for the test was 125 in 3 minutes of time.

Traids test:

The students were asked to identify the number written on their hand through specific stimulus (graphesthesia), at the same time the students were asked to identify word read by the examiner. This test was used to assess the students divided attention which was conducted on pre-lunch and post-lunch. The total score given for the test was 2.

Color trials test

Colour trials test paper part 2 was used in this study. This material has set of number from 1 to 8. Each number repeated twice and circled with yellow and pink colour. Students was asked to trace the numbers from 1 to 8 consecutively in alternate colours. This test used to assess the focused attention which was conducted on pre-lunch and evening. Time given for this particular test was 5 mins.

Random word test

A list of 20 irrelevant random words by default red out clearly and students were asked to recall and write those words in given time limit of one minute. This test used to assess the divided attention which was conducted on morning and evening. The total score given for the test was 20 in 1 minute of time.

Quick Attention test

An unknown paragraph was read out to the students and asked them to write answer by given question from the paragraph. This test used to assess the focused attention which was conducted on pre-lunch and post lunch. The total score given for the test was 4.

Matching the unfamiliar object

Students were asked to correctly match 3 objects among nine objects with an unfamiliar object on the test paper within the time limit. This test used to assess the sustained attention which was conducted on morning and post lunch. The total score given for the test was 9 in 3 minutes of time.

Word search test

The students were asked to find words from jumbled alphabets which consists of maximum 50 words within given time period. This test used to assess the focused attention which was conducted on morning and evening.

Statistical Methods

Sustained attention test, focused attention test, divided attention test was considered as primary outcome variable. Gender was considered as primary explanatory variable.

Descriptive analysis was carried out by frequency and proportion for categorical variables, mean and standard deviation for continuous variable.

The association between categorical explanatory variables and quantitative outcome was assessed by comparing the mean values. Independent sample t-test was used to compare the attention score with gender. Paired t test was used to obtain mean difference of attention score across different time period.

P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.⁷

Results

Among the study population, the mean age was 18.5 ± 0.8 , 49 (49%) students were male and 51 (51%) students were female.

Students sustained attention test

The mean score on number cancellation test at morning was 202.84 ± 86.57 and at post-lunch it

was 189.42 ± 109.690 . This conclude that students more attentive in morning when compared with post-lunch. The mean score on matching the unfamiliar object test at morning was 6.92 ± 1.613 and it was 7.54 ± 1.587 at post-lunch. The mean Digit symbol substitution test at Pre-lunch was 95.54 ± 26.095 and it was 98.33 ± 21.859 at evening. There was not much difference found on the student's attention.

Focused attention test

The mean score on cross word test at morning was 16.04 ± 6.410 and it was 9.29 ± 2.136 at evening. This conclude that students more attentive in morning when compared with evening. The mean score on Quick attention test was 2.00 ± 1.142 and it was 2.21 ± 1.888 . The mean score on Colour trails test at pre-lunch 2.506 ± 0.8911 and it was 2.696 ± 0.7919 at evening There was not much difference found on the student's attention.

Divided attention test

The mean score on random word test at morning was 7.92 ± 2.283 and it was 7.83 ± 2.140 at evening. The mean score on traids test at pre-lunch was 1.71 ± 0.464 and it was 1.79 ± 0.415 at post-lunch. Table 1

Among the study population, the mean attention score obtained from male at morning was 39.00 ± 19.55 and it was 48.76 ± 22.40 for female. The mean difference of attention score across gender was statistically significant (p value 0.022). The mean attention score obtained from male at pre-lunch was 62.57 ± 27.00 . it was 66.90 ± 27.66 for female. The mean difference of attention score across gender was not statistically significant (p value 0.430). The mean attention score obtained from male at post- lunch was 56.02 ± 25.82 . it was 42.80 ± 24.27 for female. The mean difference of attention score across gender was statistically significant (p value 0.010). The mean attention score obtained from male at evening was 67.98 ± 32.08 . it was 61.94 ± 29.24 for female. The mean difference of attention score across gender was not statistically significant (p value 0.326). Table 2

Among the students with attention score in different time period, mean difference in cross word test score (focused attention) between two time period was statistically significant. Mean difference in quick attention test score (focused attention) was statistically significant. Table 3

Baseline parameter	Summary statistics
Age (Mean±SD)	18.5±0.8
Gender	
Male	49 (49%)
Female	51 (51%)
Sustained attention test	
Number cancellation test	162.84 ± 91.52
• Morning	202.84 ± 86.57
• Post-lunch	189.42±109.690
Matching the unfamiliar object	7.14 ± 1.641
• Morning	6.92±1.613
• Post-lunch	7.54±1.587
Digit symbol substitution test	96.94 ±23.36
• Evening	98.33±21.859
• Pre-lunch	95.54±26.095
Focused attention test	
Cross word test	13.24± 6.742
• Morning	16.04±6.410
• Evening	9.29±2.136
Quick attention test	2.22 ±1.11
• Pre-lunch	2.00±1.142
• Post-lunch	2.21±1.888
Colour trails test	2.54± 0.902
• Evening	2.696±0.7919
• Pre-lunch	2.506±0.8911
Divided attention test	
Random word test	7.82 ± 2.345
• Morning	7.92±2.283
• Evening	7.83±2.140
Triads test	1.72 ± 0.454
• Pre-lunch	1.71±0.464
• Post-lunch	1.79±0.415

Table 1: Descriptive analysis of baseline parameters in the study population (N=100)

Time period	Gender		P value
	Male	Female	
Morning	39.00±19.55	48.76±22.40	0.022
Pre-lunch	62.57±27.00	66.90±27.66	0.430
Post-lunch	67.98±32.08	61.94±29.24	0.326
Evening	56.02±25.82	42.80±24.27	0.010

Table 2: Comparison of attention score in different time period across gender in the study population (N=100)

Name of the test	Types of attention	Sessions	Mean difference	P value
Matching the unfamiliar object	Sustained attention	Morning & Post Lunch	-0.635± 2.06	0.151
Number cancellation test	Sustained attention	Morning & Post Lunch	12.58±12.9	0.637
Digit symbol substitution test	Sustained attention	Pre-lunch & Evening	-2.57±28.9	0.678
Cross word test	Focused attention	Morning & Evening	6.75±6.28	<0.001
Colour trail test	Focused attention	Pre-lunch & Evening	-1.09±1.98	0.437
Quick attention test	Focused attention	Pre-lunch & Post lunch	-5.208±2.28	<0.001
Random Word Test	Divided attention	Morning & Evening	0.823±3.28	0.90
Triads test	Divided attention	Prelaunch & Post lunch	-0.082±5.23	0.45

Table 3: Table 3: Comparison of different types of attention score with different sessions (N=100)

Discussion

This study tried to compare different types of attention at different time intervals of a day among first year MBBS students and differences between the attention paid by the subjects based on their sex. Because this knowledge helps to plan, figure and split our work corresponding to the type of attention which demands.

There was not much study related with our present study, but followed by some researchers approach on different types attention assessment we carried out this present study.⁸This present study tries to compare and correlate different types of attention of undergraduates at different sessions of a day particularly of a working day so that they could have a clear idea of planning their schedule depending on the type of attention demanded by the corresponding work. Results of this study gives various conclusions such as the mean and standard deviation value of the scores of the tests carried out for different types of attention at different sessions of a day among the first year MBBS students.

In this study the scores obtained at the different sessions based on sex of the subjects revealed that female students have higher concentration and have paid more attention in morning and in pre-lunch sessions than male subjects. In evening and morning session a drastic difference is seen in the mean value of the scores between male and female. The male students were more attentive in post lunch and in evening sessions.

Female students are more attentive from the start of the day and their attention tends to fades towards the end of the working day whereas male students tend to be more attentive at the end of the day.

Conclusion

Medical education is a broad-ranging field that benefits from the diverse perspectives brought by people drawn to teaching and learning for different reasons and from different backgrounds. Our study concludes that females are more attentive at the start of the day which fades towards the end of the day whereas males are more attentive towards the end of the day. While comparing the attention outcomes across different sessions, morning session has high outcome of all three types of attention among the subjects as a whole. Evening session has comparatively high prevalence of focused and divided attention. Post-lunch session has high prevalence of sustained attention. Pre-lunch session doesn't have any significant difference in prevalence of the type of attention.

Recommendations

Suggestions for companies and educational institutions for better results and developmental changes as below,

1. Professional education need to be refined as their learning process is very important for cognition and to gain knowledge.
2. People can be made or can engage in tasks which demands for i) Any of the attention-sustained, focused or divided in morning sessions of a working day. ii) Sustained attention in post lunch session of a working day. iii) Divided or focused attention in evening sessions of a working day.

References

1. Badyal and Singh, T. Learning theories: The basics to learn in medical education. *International Journal of Applied and Basic Medical Research*. 2017;7(5): 1.
2. Soto D, Heinke D, Humphreys G W and Blanco M J. Early, involuntary top-down guidance of attention from working memory. *Journal of Experimental Psychology: Human Perception and Performance* 2005; 31(2): 248–261. <https://doi.org/10.1037/0096-1523.31.2.248>
3. Rebok G W, Ball K, Guey L T, Jones R N, Kim H Y, King J W, et al. Ten-year effects of the advanced cognitive training for independent and vital elderly cognitive training trial on cognition and everyday functioning in older adults. *Journal of the American Geriatrics Society*. 2014;62(1): 16–24. <https://doi.org/10.1111/jgs.12607>
4. Wimmer L, Bellingrath S, and Von Stockhausen L. Mindfulness Training for Improving Attention Regulation in University Students: Is It Effective? and Do Yoga and Homework Matter? *Frontiers in Psychology*. 2020;11(4):1–15. <https://doi.org/10.3389/fpsyg.2020.00719>
5. Leland M. *EJ1072925.pdf*. 2015; 44(1): 19–24.
6. IBM Corp. Released 2013. *IBM SPSS Statistics for Windows, Version 22.0*. Armonk, NY: IBM Corp.
7. Rabelo I S, Pacanaro S V, Rossetti M de O, Leme I F, et al. Color Trails Test: A Brazilian normative sample. *Psychology & Neuroscience* 2010; 3(1): 93–99.
8. Kuang Yang Y, Hsieh P, Lin Chu C, Ching Yang Y, Lih Yeh T, Hui Lee I and See Chen P. Norms of performance of sustained attention among a community sample: Continuous Performance Test study. *Psychiatry and Clinical Neurosciences* 2005;59: 170–176.

How to cite this article: Parameshwari P, Getrude Banumathi P, Sujatha S. Assessment of attention of medical undergraduates at different time intervals of a day. *Chettinad Health City Medical Journal* 2021; 10(3): 136-141.