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Original Research Article

Comparison of mind mapping and didactic instructional method in learning neuroanatomy for first MBBS students

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ABSTRACT

Background: A self-explanatory, multidimensional yet tailor made method is needed to teach complex and intricate networks in Neuroanatomy. Mind maps use a 360 approach-a central theme, radially expanding concepts explained using colours, pictures, interrelated & strategic arrangement. Mind maps are tools of active learning using constructivist theory.
Objective: To compare mind mapping and didactic instructional method in learning neuroanatomy for first MBBS students. To assess students' perception about mind mapping.
Methodology: Random controlled cross over study design was used. Pre-validated multiple-choice questions were used to assess the knowledge scores. Knowledge scores were compared by unpaired t and Mann-Whitney u test.
Results: Mean Knowledge scores of students in mind mapping group were better than students in didactic lecture group. The difference was statistically significant by applying quantitative [p value < 0.0001, at 95% confidence interval] and qualitative [p value < 0.05]test.
Conclusion: Mind mapping helps in better recall and is effective in teaching complex conceptual subjects.

1. Introduction

Complex and intricate network of connections makes Neuroanatomy a difficult subject. Students are expected to know topography, functional connections and clinical significance of these connections. Teaching hours dedicated to Neuroanatomy are less due to overall reduction of time for I medical professional year. Complexity of subject and shortage of time leads to "neurophobia" in students.[1] Challenge of Teaching neuroanatomy needs self-explanatory, multidimensional yet tailor made method. Digital tools and 3D physical models are commonly used.[2] But learner involvement is minimal in these methods. Mind maps use a 360 approach-a central theme, radially expanding concepts explained using colours, pictures, interrelated & strategic arrangement. Mind maps are interesting, self-explanatory, innovative and can be prepared by students. Mind maps are tools of active learning technics using constructivist theory.[3] We conducted this study to compare mind mapping and didactic instructional method in learning neuroanatomy for first MBBS students.

2. Objectives

1. To assess perceptions of students regarding Mind Mapping in teaching neuroanatomy.
2. To compare knowledge scores students by Mind Mapping and lecture methods in neuroanatomy using multiple choice questions.

3. Materials and Methods

Institutional ethical committee clearance was obtained.

3.1. Inclusion criteria

Students willing to participate in study.

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3.2. Exclusion criteria

Absentee / students not willing to participate in study.

3.3. Sampling technique

St year medical professional students [80] were devided into two groups by random sampling.

Group I –Mind mapping.

Group II – Didactic lecture.

Data collection Group ILesson plan was followed and explained by using Mind map for 45 minutes followed by clarification of any doubts.

Group IILesson plan prepared and explained topic using black board for 45 minutes followed by clarification of any doubts.

3.4. Post test

After the session on spinal cord, Knowledge scores were assessed using pre-validated multiple-choice questionnaire for both the groups immediately by 2 different faculties for 10 minutes.

Same method used for session II on thalamus after crossing the groups.

After mind mapping session, a feedback was obtained from the students regarding perceptions of mind mapping as teaching method using questionnaire on Likert scale from strongly disagree to strongly agree.

3.5. Statistical methods

Perceptions of students on mind mapping as teaching method using questionnaire is expressed as percentage of response favouring this method.

3.6. Descriptive statistics

Parametric test -two tailed unpaired 't' test was applied to compare the knowledge scores of students. Non parametric test- rank based, Mann – Whitney u test was applied

4. Results

4.1. Perceptions of students on mind mapping as teaching method

50 to 60% students strongly agreed mind mapping is interesting, innovative and increased attention. 45% strongly agreed the mind mapping made subject easier [Figure 1 about perception of students here].

4.2. Knowledge scores

Students of mind mapping groups scored higher than didactic lecture group. In Students of mind mapping groups % age of students scoring higher marks was more than didactic lecture group [Figures 2 and 3 about students' scores here.]

Parametric unpaired t test showed higher mean scores and Non-parametric Mann Whitney u test based on sum of ranks showed higher values in mind mapping group as compared to didactic lecture group. These differences were statistically significant [unpaired t test - $p < 0.0001$, highly significant] [Mann- Whitney u test - $p < 0.05$ significant] [Table 1 about unpaired t test results & Table 2 about Mann -Whitney u test results here.]

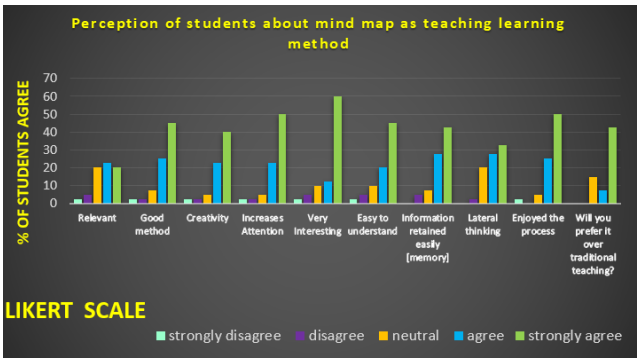

Fig. 1: Perceptions of students [in %] about mind mapping as teaching method

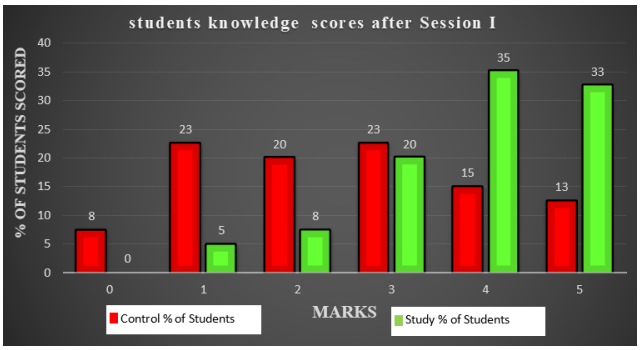

Fig. 2: Shows marks scored & % of students in study and control groups of first mind mapping session

5. Discussion

5.1. Perceptions of students on mind mapping as teaching method

90% students perceived mind mapping interesting, 82.5% said it increased attention and understood content better. 72% students agreed mind mapping is a creative method. 65% students recommended mind maps over traditional method. Students opinion about process included – "loved it", "enjoyed it", "very interesting and innovative". Students suggestions included "should implement throughout academic year", "I will use it for other subjects". Results of

Table 1: Results of quantitative analysis -using unpaired t test

Table Analyzed	Session I -Spinal Cord		Session II -Thalamus	
	Study	Control	Study	Control
Mean	2.53	3.83	2.10	4.18
SD	1.48	1.12	1.16	1.13
Standard Error Mean	0.18	0.24	0.17	0.16
Difference between means	-1.30 ± 0.29		-1.87 ± 0.23	
Independent t test (2- tailed)	0.0792 (P < 0.0001) HS		0.6264 (P < 0.0001) HS	

Table 2: Results of qualitative analysis-using Mann-Whitney u test

Table Analyzed	Session I -Spinal Cord		Session II -Thalamus	
n=40	Study	Control	Study	Control
Sum of ranks	2015	1226	2239	1002
U	405.5		181.5	
P	P < 0.05		P < 0.05	

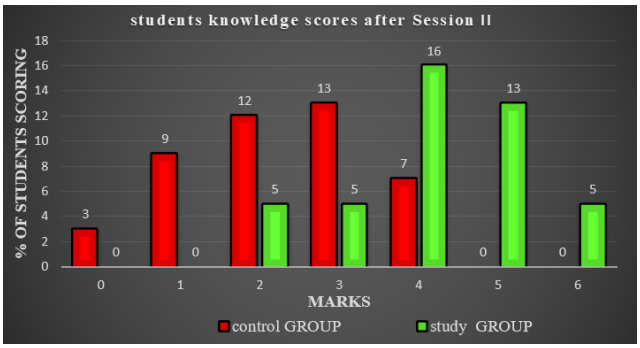

Fig. 3: Shows marks scored & % of students in study and control groups of second mind mapping session [after cross over]

a Semi structured interview-based study on social science showed that students enjoy creating and learning with mind maps.[4] Creating mind maps is difficult as it needs understanding information, conveying it in picture form and thinking strategically. This active thinking and learning help to assimilate the complex information as neuroanatomy. Making students familiar with technique and motivating them is required to achieve good results.[5]

5.2. Knowledge scores of students

Students of study group scored better than control group in both sessions of mind map. Mean score of study group for session I and II were 85% &73% and mean score of control group for session I and II were 50% & 38%. These findings were similar to those West et al. (2000), Hsu (2004), Laight (2004) of Abdolahi et al. (2011), Deshatty & Mokashi [2013] showed the improvement of learning by applying mind mapping.[6–10]

Abdolahi reported gross anatomy learning using mind maps is sex dependent. Bilateral use of neuronal networks in female students in studying mind maps helped them score better.[9] active learning, Organising, associating interdependent and non -linear concepts leads to better recall[11,12] Ferrand et al reported mere 10% better recall of facts in mind map using group as compared to self-selected study group.[5] Our study showed 35-45% better mean scores in study group. We suggest more complex the topic, more useful can be the mind maps.

Students using mind map for note taking in science showed better learning of concept, academic achievement and attitudes towards science courses.[13] Scores are better with Student centred mind maps than teacher centred mind maps. Knowledge, Inductive reasoning, analysis, and approach to solve the problem in different context are integral to critical thinking.[14]

6. Limitations

We could not assess effect of mind maps on long term recall, critical thinking and student centre versus teacher centred. These aspects require longitudinal studies. we are planning towards conducting studies.

7. Conclusions

Students perceived Mind mapping as interesting, innovative and enjoyable method of learning. Mean Knowledge scores of students in mind mapping group were better than students in didactic lecture group. The difference is proved statistically significant by quantitative and qualitative test. We conclude Mind mapping is effective in teaching complex conceptual subjects. Mind mapping, a student-centered teaching learning method because of active participation, analytic thinking and visual presentation helps in better recall.

8. Source of Funding

None

9. Conflict of Interest

None.

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