

Assessment of Learning Readiness and Usefulness of Newer Medical education Techniques in teaching Cranial nerve examination in Children and Adults - A Prospective Study Conducted in a Tertiary Medical College Hospital in India

Dr Swapna K Pillai 1 * Dr Sundeep S 2

*1 Associate Professor, Department of Paediatrics
Sree Gokulam Medical College and Research Foundation, Venjaramoodu,
Thiruvananthapuram, Kerala, India*

*2 Professor, Department of General Medicine
Travancore Medical College, Kollam, Kerala, India*

Email id:

1 swpna.pillai@gmail.com

2 drsundeepes@gmail.com

**corresponding author*

ABSTRACT

BACKGROUND: The use¹ of innovative educational methods in the process of medical education has led to favorable outcomes in many countries. Different teaching learning methods for medical students include lectures, collaborative patterns, group discussions, problem solving, e-learning, clinical education, evidence-based medicine, and medical-based simulations. Clinical examination of cranial nerves is an integral part of central nervous system examination in patients for which standard techniques are used in adults and children. Young children may be less cooperative and may require some modifications. Newer methods like video assisted teaching can be incorporated to the existing teaching learning techniques for better understanding and to facilitate long term learning .

METHOD: 240 students in final year of medical education coming in successive years were studied. They were labelled as batch A and B. Each batch of 120 students was further subdivided into smaller groups of 10 members each. Learning readiness of the students were assessed prior to the sessions using learning readiness scale with 19 questions. 4 subgroups of batch A were taught cranial nerve examination in adults and children by DOAP (Demonstrate Observe Assist Perform). 4 subgroups were taught cranial nerve examination separately by video assisted teaching. 4 subgroups were taught cranial nerves by DOAP following which a recorded video was send to the students. At the end of teaching and 2 weeks later, each group was assessed by OSCE and MCQ . The scores were rounded and put out of 10 to calculate final score .The consolidated score of OSCE and clinical examination out of 10 was systematically entered in an excel sheet and was analysed using unpaired t test .The perception to each teaching learning method was assessed by feedback Questionnaire using Likert Scale.

RESULTS: On comparing between the effectiveness of video assisted teaching and clinical demonstration of the examination of cranial nerves , students taught by video assisted teaching scored higher marks in the evaluation after two weeks, which was statistically significant. Regarding perception, students favoured combination of teaching methods for their effectiveness. For hands on demonstration on patient , practice of technique and for clearing doubts, students favoured DOAP method. For reproducibility , long term memory and revision, students favoured video assisted teaching.

CONCLUSION: Video assisted teaching was equally effective as DOAP in teaching cranial nerve examination to medical students. For reproducibility and for building long term memory combining video assisted teaching with traditional teaching methods was perceived better as reflected in the better mean scores two weeks after the teaching sessions. Students taught by combination technique scored higher in OSCE. Assessment of learning readiness before and after teaching sessions will help in orienting the students about what is expected of them as learners . It also helps the instructors to understand what type of learners are there in the class and plan the type of teaching learning methods for them.

KEY WORDS: Cranial nerve examination, Video assisted teaching , demonstrate observe assist perform technique, learning readiness

INTRODUCTION

The main goal^{2,3} of medical education is to empower and educate personnel who have the knowledge, attitudes and skills necessary to maintain and promote community health. Medical education in India is witnessing revolutionary changes with the introduction of newer teaching learning methods. These methods include lectures, collaborative patterns, group discussions, problem solving, e-learning, clinical education, evidence based medicine and medical based simulations. These methods are novel, student friendly with more participation from the students and with the utilisation of digital technology. These methods shift teaching from a teacher-centred and product-based activity to a more student-centred & process-based activity. It encourages students to be active in the experience of learning rather than being passive learners. With the advent of covid infections, the era of digital classrooms have emerged. In a field like medicine, examination skills are very important for making an accurate clinical diagnosis. A doctor must be able to recognize, analyse, refine, and deduce the correct diagnosis from clinical examination which will be supplemented by investigations. Conventional teaching methods like didactic lectures have been replaced by newer methods like focussed group discussions and video assisted teaching. Video-assisted teaching can be given to a large group and it is reproducible and helps to compensate for the lack of faculties and lack of time . It minimises inter instructor variations in teaching and produces uniformity . Techniques of clinical examination can be shown clearly. The other advantages of the use of video assisted teaching are that it allows for more retention and repetition and facilitates long term learning. In this study, the effectiveness of video assisted teaching versus DOAP(Demonstrate Observe Assist Perform) and combination techniques in teaching cranial nerve examination is assessed. Examination of cranial nerves is an important skill to be mastered in clinical examination and helps to localise a central nervous system pathology.

OBJECTIVES

1. To compare video assisted teaching, DOAP and combination of techniques in teaching cranial nerve examination to the medical students
2. . To assess the perception of students to video assisted teaching, DOAP and combination of techniques.
3. To assess the learning readiness of medical students.

MATERIAL AND METHODS

The Study setting was a tertiary care teaching hospital in Kerala, India

Study Design-Interventional study

Study Population-Phase II MBBS students

Study period- 2019-2021

Sample size- 240 medical students in Phase 2 in successive years were selected for the study.

Sampling method – Convenient Sampling.

Inclusion criteria-Phase II medical students who are willing to participate after getting an informed consent

Exclusion criteria- Phase II medical students who are not willing for the study.

Intervention- The students were divided into groups and taught by Video assisted teaching, DOAP and combination of techniques.

Study tool- OSCE Check-list will be provided for assessment. The perception will be assessed using a Likert Scale based Feedback Questionnaire. Learning readiness was assessed by self-directed learning questionnaire.

Data collection – Total 240 students coming in successive years were selected for the study divided into 2 batches. The students were divided into groups of 10 students each. Learning readiness of the students were assessed by learning readiness scale with 19 items. 4 batches were taught cranial nerve examination separately by DOAP. 4 batches were taught cranial nerve examination separately by video assisted teaching. 4 batches were taught by a combination of techniques. At the end of the teaching, each batch is assessed by OSCE. After two weeks of teaching, each batch is again assessed by OSCE. Objective Structured Clinical Examination checklist marks are entered in an excel sheet. A feedback questionnaire was also given to the students. The perception of students will be assessed by feedback Questionnaire using a Likert Scale. There will be a crossover of the batches after the conclusion of the study for ethical reasons.

Statistical analysis – Data was collected and entered in a Microsoft excel sheet and analyzed using anova tests by SPSS software. Ethical consideration – Institutional Ethics committee clearance was taken before commencing the study

Informed consent – informed written consent was taken from all students before conducting the study. Source of funding nil. Conflict of interest- Nil

RESULTS

Table 1

Table showing the effectiveness of video assisted teaching, clinical demonstration of the examination of cranial nerves and combination of techniques at the end of teaching using anova testing

SKILL	no	mean	SD	P value	F value
Examination of cranial nerves by video assisted teaching	80	6.542	.7362	.019	15.53
Examination of cranial nerves by DOAP alone	80	6.322	.6900		
Examination of cranial nerves by combined video assisted teaching and DOAP	80	6.899	.5400		

40 students were taught about deep tendon reflexes by video assisted teaching whereas 40 students were taught the same topic by clinical demonstration. For the first group, the mean marks obtained was 6.542 with standard deviation of .7362. For the second group, the mean marks obtained was 6.322 with standard deviation of 6900. For the third group where the combined method was used, mean marks was 6.66 and SD was .7589. The p value obtained by one way anova test was .019. There was statistically significant difference in the mean marks obtained by students, taught by the three techniques at the end of teaching with the students taught by a combination of techniques getting higher marks.

TABLE 2

Table showing the effectiveness of video assisted teaching, clinical demonstration of the examination of cranial nerves and combination of methods after two weeks of teaching

SKILL	no	mean	SD	P value	f value
Examination of cranial nerves by Video assisted teaching	80	6.893	.8562	.000001	216.358
Examination of cranial nerves by DOAP	80	5.112	.7359		
Examination of cranial nerves by combined video assisted teaching and DOAP	80	7.121	.2600		

The students taught by video assisted teaching were given a copy of the video used for teaching. The knowledge of the students were assessed at the end of 2 weeks by objective structured evaluation questionnaire. For the first group of students who were taught by video assisted teaching, the mean marks obtained was 6.893 and standard deviation was .8562. For the second group of students who were taught by direct demonstration, the mean marks obtained was 5.112 and standard deviation was .7359. For the third group of students who were taught by combination of techniques, the mean marks obtained was 7.121 and standard deviation was 0.260. The above table showed that there was a statistically significant difference in the mean marks obtained by students and those taught by combined teaching scored higher marks in the evaluation after two weeks.

Table 3

Table showing the perception of students to video assisted teaching of examination of cranial nerves. (group V)

Parameters	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Session was interesting	0(0.0%)	0(0.0%)	5(6.25%)	46(57.5%)	29(36.25%)
Time limit was maintained	0(0.0%)	7(8.75%)	17(21.25%)	34(42.5%)	22(27.5%)
Tests were clearly performed and explained	0(0.0%)	0(0.0%)	13 (16.25)	38(47.5%)	29(36.25%)
Understanding and following the subject was better	0(0.0%)	0(0.0%)	4 (.05%)	73(91.7%)	3(3.755)
Could corelate with existing knowledge	0(0.0%)	0(0.0%)	5(6.25%)	68(85%)	7(8.75)
Doubts were clarified	0(0.0%)	0(0.0%)	31(38.75%)	38(47.55)	11(13.75%)
Helps to retain memory	0(0.0%)	0(0.0%)	4(5%)	74(94.2%)	1(1.25%)
Help to improve current performance	0(0.0%)	0(0.0%)	9(11.25%)	40(50.8%)	31(38.75%)
Confidence to do it again	0(0.0%)	0(0.0%)	5(.05%)	52(65%)	23(28.75%)
Would recommend this for other subjects	0(0.0%)	0(0.0%)	4(.05%)	17(21.25%)	59(73.75%)
Understood patient interaction and rapport	0(0.0%)	0(0.0%)	3(3.75%)	45(56.25%)	32(40%)
Technique was effective and beneficial	0(0.0%)	0(0.0%)	3(3.75%)	56(70%)	21(26.25%)

TABLE 4

Table showing the perception of students to the clinical demonstration of examination of cranial nerves(DOAP)(Group D)

Parameters	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Session was interesting	0(0.0%)	2(2.5%)	4(5%)	44(55%)	30(37.5%)
Time limit was maintained	0(0.0%)	20(25%)	19(23.7%)	30(37.5%)	11(13.7%)
Tests were clearly performed and explained	0(0.0%)	0(0.0%)	5(6.25%)	64(80%)	11(13.75%)
Understanding and following the subject was better	0(0.0%)	0(0.0%)	4(5%)	61(76.25%)	15(18.75%)
Could corelate with existing knowledge	0(0.0%)	0(0.0%)	7(8.75%)	59(73.75%)	14(17.5%)
Doubts were clarified	0(0.0%)	0(0.0%)	16(20%)	52(65%)	12(15%)
Helps to retain memory	0(0.0%)	8(10%)	42(52.5%)	21(26.25%)	9(11.25%)
Help to improve current performance	0(0.0%)	0(0.0%)	25(31.25%)	41(51.25%)	14(17.5%)
Confidence to do it again	0(0.0%)	3(3.75%)	5(6.25%)	52(65%)	20(25%)
Would recommend this for other subjects	0(0.0%)	5(6.25%)	5(6.25%)	48(60%)	22(27.5%)
Understood patient interaction and rapport	(0.00%)	4(5%)	4(5%)	55(68.75%)	17(21.25%)
Technique was effective and beneficial	0(0.0%)	2(2.5%)	8(10%)	58(72.5%)	12(13.75%)

TABLE 6

Table showing the feedback of students taught by a combination of techniques(Group C)

Parameters	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Session was interesting	0(0.0%)	0(0.0%)	2(2.5%)	18(22.5%)	60(75%)
Time limit was maintained	0(0.0%)	2(2.5%)	7(8.75%)	30(37.5%)	41(51.25%)
Tests were clearly performed and explained	0(0.0%)	0(0.0%)	4(5%)	55(68.75%)	22(27.5%)
Understanding and following the subject was better	0(0.0%)	0(0.0%)	4(5%)	45(56.25%)	31(38.75%)
Could corelate with existing knowledge	0(0.0%)	0(0.0%)	2(2.5%)	56(70%)	22(27.5%)
Doubts were clarified	0(0.0%)	0(0.0%)	3(3.75%)	46(57.5%)	31(38.75%)
Helps to retain memory	0(0.0%)	0(0.0%)	2(2.5%)	48(60%)	30(37.5%)
Help to improve current performance	0(0.0%)	0(0.0%)	1(1.25%)	57(71.5%)	22(27.5%)
Confidence to do it again	0(0.0%)	0(0.0%)	2(2.5%)	48(60%)	30(37.5%)
Would recommend this for other subjects	0(0.0%)	0(0.0%)	3(3.75%)	19(23.75%)	58(73.75%)
Understood patient interaction and rapport	(0.00%)	(0.00%)	5(2.5%)	38(47.5%)	37(46.25%)
Combination technique was effective and beneficial	0(0.0%)	0(0.0%)	1(1.25%)	22(27.5%)	57(71.25%)

A feedback questionnaire was administered to the students. 95% of group V agreed that the session was interesting vs 93.5% of group D and 97.5% of group C. 69% of group V agreed that time limit was maintained vs 51.25% of group D and 87% of group C. Time limit was not maintained for direct group compared to video and combined group. 83% of group V agreed that tests were clearly performed and explained vs 93.75% of group D and 95% of group C. 95% from group V agreed that understanding and following the subject was better VS 92% in D group and 96% from group C. There was no statistically significant difference regarding understanding or correlation with existing knowledge in video and direct group. 93.75% in group V agreed that they could corelate with existing knowledge vs 88.25% in group D and 97% in group C. 60.75% in group V agreed that doubts were clarified VS 80% in D group and 96.25% from group C. Doubt clarification was more with direct

group compared to video group. 95% students in group V agreed that video assisted teaching helped to retain memory VS 37.5% in D group and 97.5% from group C. Retention of memory was more with video assisted learning and combined methods compared to direct demonstration alone. 88.75% in group V agreed that it helps to improve current performance VS 68.75 % in D group and 94% from group C. 95% in group V agreed about reproducibility VS 67.5% in D group and 97.5 % from group C. Reproducibility was more with video group and combined group as they could revise multiple times seeing the video.94.7% in group V agreed that the technique can be used for other subjects as well vs 87.5% in D group and 97.5 % from group C. 96.2% students in group V agreed that the technique was beneficial to them vs 87.5 % in D group and 98.7% from group C. The combined group got more score which was statistically significant in the areas of understanding, retention of memory, correlation with existing knowledge and improvement of current performance.

TABLE 5 TABLE SHOWING COMPARISON BETWEEN 3 GROUPS

Parameters	Group D	GROUP V	Group C	P value D vs V	P value V vs C	P value D vs C
Session was interesting	93.5	95	97.5	.73	.2026	.078
Time limit was maintained	51.25	69.9	87	.0007	.0004	.0001
Tests were clearly performed and explained	93.75	83.75	96.25	.418	.002	.001
Understanding and following the subject was better	92	95	98.75	.022	.07	.07
Could correlate with existing knowledge	88.25	93.75	95	.197	.1152	.3678
Doubts were clarified	80	60.75	96.25	.002	.00001	.0007
Helps to retain memory	37.5	95.25	97.5	.0001	.632	.0001
Help to improve current performance	68.75.	88.75	96	.00002	.093	.00002
Confidence to do it again	80	93.75	97.5	.00001	.69	.00001
Would recommend this for other subjects	87.5	94.7	96	.1396	1.957	.5
Understood patient interaction and rapport	90	88.25	97.75	.818	1.56	.5
technique was effective and beneficial	86.25	96.2	99.7	.0466	1.858	.006

Table 7
Table showing the learning readiness score of students

parameter	Almost never true %	Not often true %	Sometimes true %	Usually true %	Almost always true %
1.I'm looking forward to learning	0	0	0	64.2	35.71
2.I know what I want to learn	0	28.5	35.7	14.2	21.4
3.When I see something that I don't understand, I stay away from it	35.71	7.1	35.7	7.1	0
4.If there is something I want to learn, I can figure out a way to learn it.	0	7.1	7.1	50	28.5
5. I love to learn.		14.2	21.4	42.8	21.4
6.It takes me a while to get started on new topics	14.2	14.2	14.2	21.4	50
7.I expect the teacher to tell all class members exactly what to do at all times.	41.5	19.5	26.7	12.3	10
8. I believe that thinking about who you are, where you are, and where you are going should be a major factor	12.2	21.8	43.6	22.4	0
9.I don't work very well on my own	44.8	25.6	17.2	12.4	0
10.If I discover a need to get information, I know where to get new information	0	3	6	66	25
11. I can learn things on my own better than most people	2	4	8	62	24
12.Even if I have a great idea, I cant develop plans to make it work	5	6	49	21	19
13.In a learning experience, I prefer to decide what will be learned and how	9	11	42.5	27.5	10
14.Difficult study doesn't bother me if iam interested	8	12	41	26	13

in it					
15.No one but me is responsible for what I learn	7	14	39	22	18
16.I can tell whether iam learning well or not	8.8	10.6	41.2	20.3	19.1
17.There are so many things to learn, I wish to have more hours in a day	6.6	4.5	53	22	13.9
18.If there is something I have decided to learn , I can find time for it	5.5	4.5	43	19.6	27.4
19.Understanding what I read is a problem for me	12	28.3	33.7	22	4

99% students were looking forward to learning. Only 71.3% knew what they wanted to learn. 85.2% loved to learn.39% were ready to tackle difficult topics.42.8% stayed away from the topic if it was difficult 85.1% knew how to figure out a way to learn. 85.2% opined that they loved learning. 29.6% felt that they could not work on their own. 85.6% felt that they took some time to learn new topics.33.9% wished to have more hours for learning. 39.3% wanted the teacher to give instructions all the time. 80% felt that they should decide what and how to learn.39.1 % could do a self assessment of their learning habits.79% were ready to take responsibility for their learning. 90% were sure that they could find time for learning. 59% had difficulty in understanding what they were reading.

Discussion.

Assessment of cranial nerves is a topic where the proper understanding of clinical sign elicitation and interpretation is important. In direct demonstration, establishing rapport with the patient and winning their confidence is also important. Both traditional and video assisted teaching method was found to be equally effective in improving the knowledge of undergraduate students in this topic. Objective structured clinical examination and multiple-choice questions can be used to quickly assess the understanding and skill of the students. It is an indirect assessment of the efficiency of the teaching method also. In our study, there was no statistically significant difference in the mean marks obtained by students, taught by the DOAP and video assisted techniques at the end of teaching. But those who were taught by a combination of both techniques showed better skills and better understanding of the subject initially itself. At the end of two weeks when OSCE was conducted, there was a statistically significant difference in the mean marks obtained by students, taught by the two techniques. Those taught by video assisted teaching and combination technique scored higher marks than those taught by direct demonstration alone. This may be attributed to the better reproducibility of the teaching method (video assisted teaching) which was utilized for self-directed learning. This may have helped in retaining the memory. Understanding and following the subject was better with combined technique as this would appeal to both auditory and visual learners. Clinical demonstration has the advantage of being economical

and doesn't need infrastructure or digital facilities. But visibility may be hindered if the number of learners are more. Slow learners may find it difficult to understand in the limited time. There may be interpersonal variations if different teachers are taking classes for the different students. Study by Maloney et al⁵, observed significant difference between perceived educational value, with teaching approaches of pre-recorded video tutorial and student self-video being rated higher than traditional live tutoring. Praiijmakers⁶ in his study found that video assisted teaching is an efficient tool in teaching reflexes to medical students. Small group discussion⁷ is more influential than the traditional method of lecturing in terms of the level of learning, interest and satisfaction of students, encouragement for participation in discussions. Educational methods that are solely teacher-centered and based on prior knowledge of instructors do not meet the needs of today's students and instructors should use new methods of teaching. Regarding perception, students favoured both teaching methods for their effectiveness. For clarifying doubts, students favoured the DOAP method. For reproducibility and better retaining of memory, students favoured video assisted teaching. One technique of student directed learning^{13,14} is E Learning where content is delivered electronically & the learner uses virtual learning environment which is also called web-based learning using computer based instructions. E-learning can be synchronous or asynchronous. In the synchronous type teacher & learner are physically separated. In asynchronous type the teacher prepares the courseware before start of curriculum. The advantage of e learning is that it allow learners to work at their own pace. E-learner is self-directed, self-motivated, self regulating & life-long learner. K Bhoumik¹⁰ et al, in his study on the assessment of perception of medical students to different teaching-learning methods shows that students prefer individualised teaching. According to the study done by Bhagat¹¹ PR et al, 73.8% teachers favoured a change in teaching with introduction of newer techniques and skill based assessments. Study by Girimallesh¹² et al found that electronic resources are quite useful to medical students. Study by Morgan¹³ et al found that both video assisted and simulator type of faculty-facilitated education offer a valuable learning experience. Study by Sood¹⁴ et al and Solanki¹⁵ et al found that redesigning the curricula with stricter implementation and improved teaching and assessment methodologies will generate efficient medical graduates and consequently better health care delivery, and resulting in desired change within the system.

CONCLUSION

The best educational model for medical students is the use of modern education techniques alongside traditional methods as a combination for better understanding of the subject and also to enhance skill building.

The limitations of this study are that there can be interpersonal differences in the opinions of students. Also, different students have different cognitive abilities, attention span and memory capacity. This also must have affected their understanding of the subject

Bibliography

1. Mostafa Ataei, Saeid Saffarian Hamedani, Farshideh Zamani. Effective methods in medical education: from giving lecture to simulation. *J Adv Pharm Edu Res* 2020;10(S1):36-42
 2. Kundra, Pankaj; Kurdi, Madhuri¹; Mehrotra, Shikha²; Jahan, Nikahat³; S, Kiran³; Vadhanan, Prasanna Newer teaching-learning methods and assessment modules in anaesthesia education. *Indian Journal of Anaesthesia*: January 2022 - Volume 66 - Issue 01 - p 47-57
 3. Karimi Monaghi, H., Rad, M., & Bakhshi, M. (2013). Do the New Methods of Teaching in Medical Education have Adequate Efficacy?: A Systematic Review. *Strides in Development of Medical Education*, 10(2), 271-280
 4. Swanwick, T. (2013) Understanding medical education. *Understanding Medical Education: Evidence, Theory and Practice*, 1-6.
 5. Maloney S, Storr M, Paynter S, Morgan P, Ilic D. Investigating the efficacy of practical skill teaching: a pilot-study comparing three educational methods. *Adv Health Science Education Theory Practical*. 2012 Feb 22
 9. Hopkins, L., Hampton, B. S., Abbott, J. F., BueryJoyner, S. D., Craig, L. B., Dalrymple, J. L., Page Ramsey, S. M. (2018). To the point: medical education, technology, and the millennial learner. *Am J Obstet Gynecol*, 218(2), 188-192. doi: 10.1016/j.ajog.2017.06.001
 10. Rahimkhani, M., & Shirazi, M. (2015). Comparison of training methods on student learning levels. *Laboratory & Diagnosis*, 7(27), 40-46
 - 11.. Habibi, H., Khaghanizade, M., Mahmoodi, H., Ebadi, A., & seyedmazhari, M. (2013). Comparison of effects of Modern Assessment Methods (DOPS and Mini-CEX) with traditional method on Nursing Students' Clinical Skills: A Randomized Trial. *Iranian Journal of Medical Education*, 13(5), 364-372 (Persian)
 12. Talebi, A., Nourbakhsh, N., Mottaghi, P., Dadgostarnia, M., & vafamehr, V. (2011). New Teaching/learning model for medical students, according to integration of usual educational methods in Isfahan University Of Medical Sciences. *Iranian Journal of Medical Education*, 10(5), 1198-1208
 13. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of e-learning in medical education. *Acad Med*. 2006;81:207-12.
 14. Gade S, Chari S. Case-based learning in endocrine physiology: An approach toward self-directed learning and the development of soft skills in medical students. *Adv Physiol Educ*. 2013;37:356-60
-
-