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Original Research Article

Effectiveness of Video Teaching Versus Bedside Demonstration for Anthropometric Measurements Among Medical Undergraduates

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ABSTRACT

Background: Teaching learning methods are continuously upgraded in the field of medical education. The educators have to utilise technology advancements to create an interactive learning environment. Video-based education is one such method. Video teaching offers several advantages; but it is debatable whether videos can substitute bedside demonstration.
Objectives: To compare the effectiveness of teaching anthropometric measurements among medical undergraduates using video teaching and bedside demonstration and to assess students' perceptions towards these two methods.
Materials and methods: This was a quasi-experimental study conducted over a period of three months in the Department of Pediatrics. Fifty-eight Phase II MBBS students participated in the study. They were divided into two equal groups and taught six anthropometric measurements. One group underwent video teaching and the other had bedside demonstration. The interventions were switched over after the first three topics. Post intervention OSCE tests were done on the same day and after one week. The scores were compared using appropriate statistical tests. A validated questionnaire was used to assess students' perceptions.
Results: The overall immediate post intervention score was higher in the bedside group (mean=4.54 ± 0.48) compared to the video teaching group (mean=4.16 ± 0.66) which was statistically significant (p =0.0001). The test conducted after one week demonstrated a marginally higher score for the video group than the bedside group but it was not statistically significant (p=0.52). Students' perceptions revealed a greater preference for bedside method as 97% of them considered this approach to be engaging and interesting.
Conclusion: The study found that bedside teaching was a better method compared to video teaching to demonstrate anthropometric parameters to medical undergraduates. Video instruction can support or augment traditional teaching techniques but it cannot replace bedside tutorials.

Keywords: Bedside demonstration, Anthropometric measurements, Video teaching

INTRODUCTION

Anthropometric measurements are simple, non -invasive methods to evaluate nutritional status of children. It provides a gateway to monitor the health and growth pattern among pediatric population and help

in early identification of systemic illness. It is essential that medical students learn how to measure anthropometric indices reliably.

In recent years, electronic learning has grown significantly in medical education. The COVID 19 pandemic added momentum to this practice. Among the various e learning formats, online videos are more popular as they keep human mind focused. Videos can be accessed anywhere, anytime and thus allow personalised, self-paced learning.[1] This online platform assumes significance in the context of increasing student-educator ratios amidst the prevailing resource constraints. Furthermore, video-based learning helps to lessen the subjectivity of the conventional instructional strategies which are also time consuming. Video instruction will be of great value in clinical departments where educators have to balance the roles of consultant and teacher, which may compromise the teaching time. This method can also make up for the lack of space in overcrowded wards. Videos can promote different learning styles specially 'visual learning'.[2] They can be used as good revision tool. Dwyer has demonstrated that retention was 10% for telling alone and 65% for combined showing and telling.[3]

This innovative teaching learning method has an added advantage in Pediatrics where it is difficult to get the cooperation of the patients. Unlike examining adult patients, students are uncomfortable performing examination on children. Parents of pediatric patients will be hesitant to give consent also. These challenges may affect the acquisition of clinical skills. Video teaching helps to overcome these barriers to some extent and so its possibilities should be explored.

In a study conducted by Shirly Kurian and Gokul comparing video assisted teaching and bed side demonstration, for obstetric palpation, the results showed that the post-test OSCE scores were significantly higher in video group.[4] Another study comparing effectiveness of video assisted versus conventional demonstration in teaching hematology practical exercises in Pathology showed that the students who were trained by video demonstration had outperformed in the practical exercises.[5] Padmavathy et al. had done a similar study among first year medical undergraduates which concluded that video group achieved better scores. They noted that in video demonstration group, the scores were higher among students with low academic performance.[6]

In another research done by Z. Friedman on video-assisted structured teaching to improve aseptic technique during neuraxial block, the results proved that video demonstration helped greatly to enhance aseptic practice by novice trainees.[7] A systematic narrative review on the role of online videos in teaching procedural skills to post-graduate medical learners by Komal Srinivasa and colleagues concluded that online videos were an excellent teaching resource.[8]An article by Ang et al. on using videos in medical education revealed that a suitable short video incorporated in the curriculum will trigger active learning.[9]

One study by George et al., comparing video demonstration and bedside tutorials for teaching Pediatric clinical skills, the students and clinician educators opined that videos can be used for teaching basic concepts and bedside tutorials for applied learning. They suggested that video demonstration may provide a cost effective and scalable intervention in institutions where the number of students is increasing.[10] Another publication by G Rajkumar and N Ambarasi about the utility of videos for improving performance skills in Pediatric anthropometric measurements inferred that videos could reinforce traditional demonstration but cannot substitute it.[11] A research among nursing students, by Kaur et al. suggested that live demonstration can be combined with video assisted teaching to improve knowledge acquisition and skill development.[12] A systematic review and meta-analysis published by B P Mao et al. concluded that basic surgical skills can be taught effectively using videos.[13]

It's still inconclusive whether video instruction can replace conventional bedside clinical skill demonstration. There are not many studies on video teaching in the domain of psychomotor learning and that too, which focus on anthropometric measurements are very limited. The published studies have been reported from developed nations.[10] Therefore it is obvious that more studies are required in this field in our country. So, we conducted this research among medical students to determine whether video instruction was as good or better than bedside method in teaching anthropometric measurements.

Aim:
To compare the effectiveness of teaching anthropometric measurements among medical undergraduates using video teaching and bedside demonstration and assess students' perceptions towards these teaching methods.

Objectives:

1. To compare the effectiveness of teaching anthropometric measurements among medical undergraduates using video teaching and bedside demonstration.
2. To assess students' perceptions towards video-based learning and bedside demonstration as teaching learning methods.

MATERIALS & METHODS

Study design and setting: This was a quasi- experimental cross over study conducted in the Department of Pediatrics, KMCT Medical College, Kozhikode.
Study duration: April 2025 to June 2025 (3 months)
Study Population: Phase II MBBS students posted in the Dept. of Pediatrics during the study period.
Inclusion criteria: Students who gave consent were included in the study.
Exclusion criteria: Those who were absent on any of the sessions were excluded.
Sample size: Six sessions for 58 MBBS students undergoing Phase II posting.
Sampling method: Convenient sampling
Interventions:
Video teaching
Bedside demonstration

Study procedure
The study was commenced after getting approval from the Institutional Ethical Committee (Ref. No. IECKMCT/99/2025) The students were sensitised about the intervention and those who gave consent were included. The sample size was fifty-eight (n=58). The study population was divided into two groups, group A and group B, with twenty-nine students in each group. Each group was again subdivided into three subgroups (A1, A2, A3 and B1, B2, B3) The students were taught six anthropometric measurements. Group A received the first set of three anthropometric measurements through video instruction using validated, authentic videos, while Group B received bedside tutorials. An OSCE was conducted on the same day for immediate assessment and after one week for the retention (as a surprise test) by blinded faculty using a validated OSCE check list. After this there was cross over of the groups and the next set of three anthropometric measurements were taught by video teaching to group B and by bedside tutorials to group A. Again, an OSCE was conducted on the same day for immediate assessment and after one week for the retention (as a surprise test) by blinded faculty using a validated OSCE check list. A validated questionnaire with 5-point Likert scale was distributed after the study to collect the students' feedback. Confidentiality of data was maintained throughout the study. **(Figure.1)**

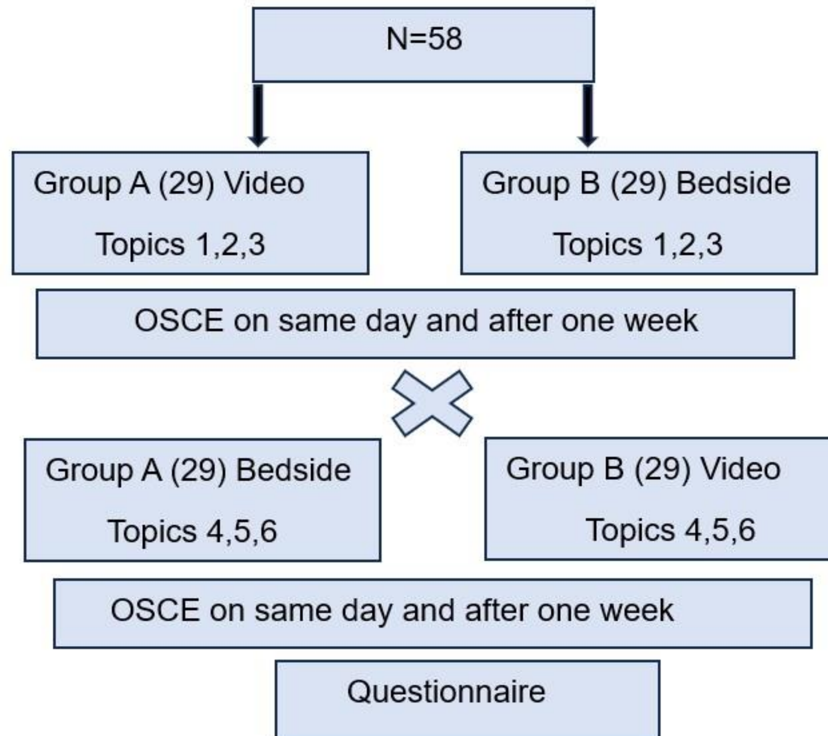

Figure 1: Flowchart of intervention for video teaching and bedside demonstration

List of six anthropometric measurements included in the study

Topics	Group A (29 students)	Group B (29 students)
	VIDEO TEACHING	**BEDSIDE DEMONSTRATION**
1	Measurement of weight	Measurement of weight
2	Measurement of height	Measurement of height
3	Measurement of head circumference	Measurement of head circumference
	BEDSIDE DEMONSTRATION	**VIDEO TEACHING**
4	Measurement of length	Measurement of length
5	Measurement of chest circumference	Measurement of chest circumference
6	Mid Upper Arm Circumference	Mid Upper Arm Circumference

Statistical Analysis

Data (post- test OSCE scores - both immediate and retention) was entered in Microsoft Excel and analysis was done using SPSS 16 version. Mean scores with standard deviation were calculated for both methods for each parameter and was compared by independent t test. Level of significance was taken as 5%. Student perception was expressed as qualitative data in percentages

RESULTS

The overall immediate post-intervention OSCE score was higher in the bedside demonstration group (mean=4.54 ± 0.48) compared to the video teaching group (mean=4.16 ± 0.66) which was statistically significant(p=0.0001). **(Table.1)**

Table 1: Comparison of overall immediate post intervention score between video teaching and bedside demonstration

Method	N	Mean	SD	p value
Video teaching	29	4.16	0.66	**0.0001***
Bedside demonstration	29	4.54	0.48	

In the topic wise comparison of immediate post-test OSCE scores, the bedside demonstration group outperformed the video teaching group in all the six anthropometric measurements. Out of the six parameters, the scores were statistically significant for four measurements. These were measurement of head circumference (p=0.04), chest circumference (p=0.0001), length (p= 0.00001) and Mid Upper Arm Circumference (p=0.008). The mean OSCE marks were higher for the bedside group in weight and height measurement also although it was not statistically significant **(Table.2).** Each topic was scored out of 5 marks.

Table 2: Comparison of immediate post intervention score between video teaching and bedside demonstration on six different topics

Anthropometric measurement	Video Teaching			Bedside Demonstration			p value
	N	Mean	SD	N	Mean	SD	
Head circumference	29	3.98	0.86	29	4.34	0.42	**0.04***
Weight	29	4.36	0.51	29	4.39	0.71	0.83
Height	29	4.50	0.55	29	4.65	0.33	0.19
Chest circumference	29	4.08	0.59	29	4.65	0.46	**0.0001***
Length	29	4.00	0.70	29	4.70	0.38	**0.00001***
Mid Upper Arm Circumference	29	4.05	0.58	29	4.43	0.45	**0.008***

The retention test that was administered one week post intervention showed that the overall score was higher for the video teaching group but it was not statistically significant (p=0.52). **(Table.3)**

Table 3: Comparison of overall retention score between video teaching and bedside demonstration

Method	N	Mean	SD	p value
Video teaching	29	3.61	0.50	0.52
Bedside demonstration	29	3.58	0.49	

In the topic wise comparison for retention test, video instruction group had a minimal increase in the OSCE scores in four of the measurements (head circumference, weight, height, Mid Upper Arm Circumference) and the bedside group fared better in the other two parameters (chest circumference, length). None of these differences was statistically significant. **(Table. 4)**

Table 4: Comparison of retention score between video teaching and bedside demonstration on six different topics

Anthropometric measurement	Video Teaching Group			Bedside Demonstration Group			p value
	N	Mean	SD	N	Mean	SD	
Head circumference	29	3.46	0.44	29	3.41	0.62	0.71
Weight	29	4.08	0.35	29	3.96	0.26	0.14
Height	29	3.70	0.43	29	3.60	0.47	0.38
Chest circumference	29	3.44	0.46	29	3.53	0.39	0.45
Length	29	3.53	0.48	29	3.58	0.50	0.68
Mid Upper Arm Circumference	29	3.48	0.55	29	3.46	0.46	0.89

Perception of students on the two learning methods

With regard to students' perceptions, majority of them preferred bedside teaching. 97% of the students commented that bedside demonstration was engaging and interesting and 88% of them opined that it instilled more confidence in them. Most of the participants agreed that bedside teaching was standardized and systematic (73%), provided clear concepts (90%), helped long term retention (75%), and improved reproducibility of steps (79%). Video teaching was mainly perceived as time

saving (83%) and as a superior revision tool (80%).43% of the learners preferred a blended approach. The results are shown in **Figure 2** and **Figure 3**.

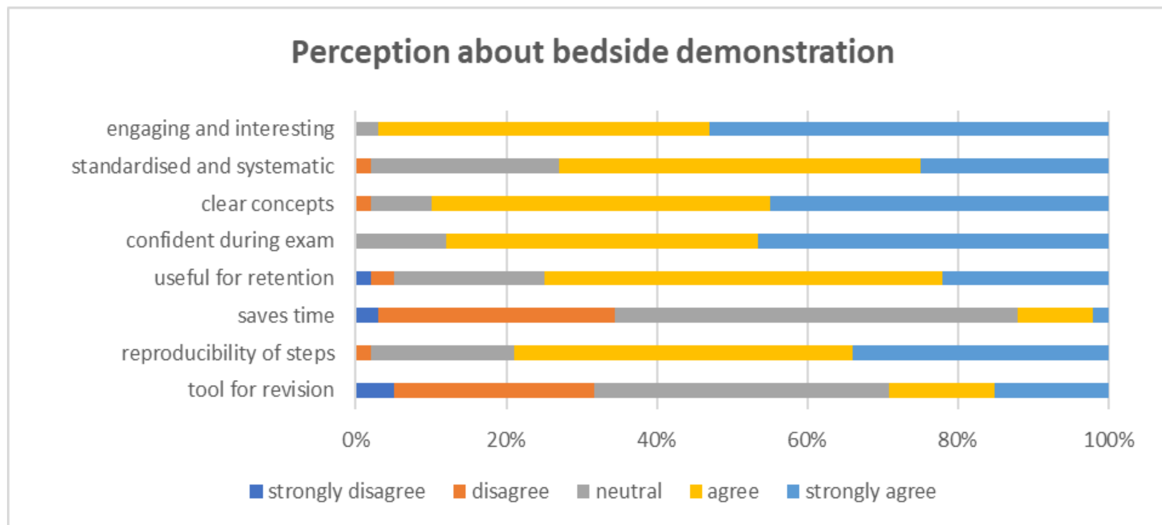

Figure 2: Student perception of bedside demonstration using 5 -point Likert scale

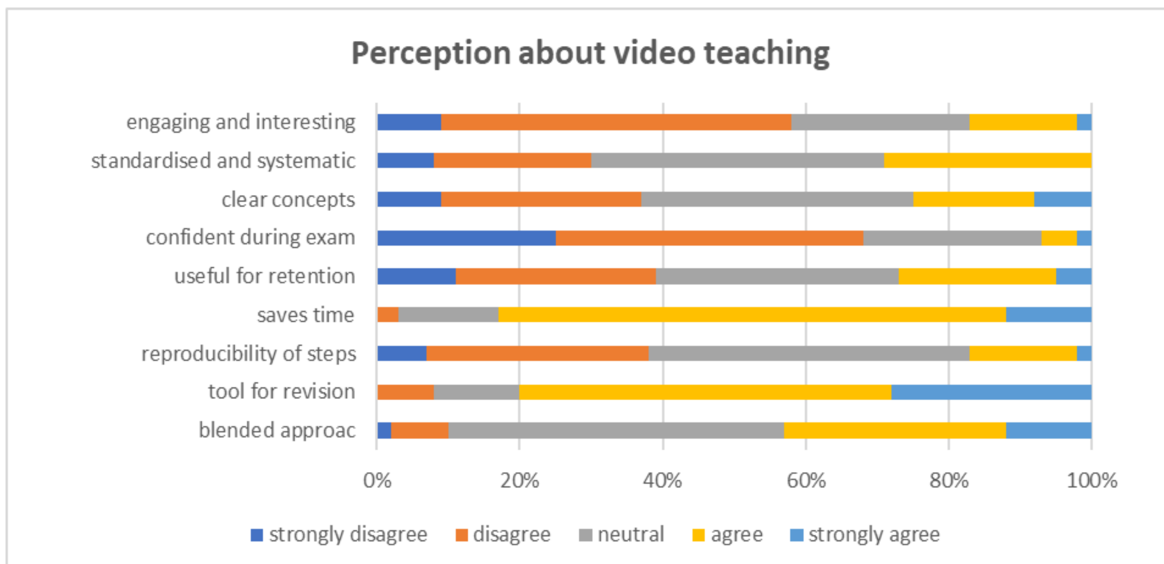

Figure 3: Student perception of video teaching using 5 -point Likert scale

DISCUSSION

This study focused on the effectiveness of video teaching compared to bedside demonstration in teaching anthropometric measurements. The study analysed both the immediate performance and the retention of the skills after one week. In the immediate assessment, the bedside tutorial group outperformed the video group in all the six topics. And out of them, four scores were statistically significant. A study by George et al, showed similar results in which the scores were lower for the video group.[10] Another study by G Rajkumar and N Ambarasi, done at Chennai, also fetched same results.[11] Similarly another comparative study among nursing students, by Kaur et al, the mean score was more in the live demonstration group.[12]

Contrary to this, in a study conducted by Shirly Kurian and Gokul, the results proved that the post-test OSCE scores were noticeably higher in video based learning group.[4] Research by Anitha Das and Praseeda in Pathology; and Padmavathy et al. in Physiology practical exercises also highlighted benefits for the video -based learning group.[5,6]

An article by Yousef et al. critically analysing the current research in video-based learning from 2003 commented that the use of videos in educational settings produced mixed outcomes with some reporting no discernible effects and others finding it useful.[2]

In our study, the video teaching group performed inferior to the conventional teaching group.

Our participants consisted of Phase 2 students who are new to the clinical departments and so lack familiarity with the clinical skills. Given the strong performance of the bedside demonstration group in the OSCE in our study, it prompts us to consider if we should adhere to traditional teaching methods in Pediatrics for undergraduates during the early phases of their training in psychomotor skills. Videos can serve to deliver theoretical lessons (cognitive domain) for beginners but might not be applicable for practical sessions. Videos may be trusted for instructing clinical skills during advanced phases.

The participants in this research were subdivided into small groups of nine or ten members each; thus, it was comparatively easier for them to observe the bedside demonstration, possibly resulting in better scores. This benefit might not be present if the figures in the group had been greater. One advantage of video teaching over bedside instruction is that it serves as a more efficient resource with larger groups of students. Likewise, the bedside tutorial was carried out by the same teacher (lead researcher) for the purpose of research. This might have led to certain biases. Additionally, the inherent variability in the teaching method, which is a drawback of the traditional approach had been circumvented as well.

The disparities in marks and their statistical significance were most evident in measurement of head circumference, length, and mid-upper arm circumference. These anthropometric measurements are unique to children; they necessitate increased cooperation from patients and are more complex tasks to perform. This underscores that in-person tutorials are more effective way to teach complex clinical skills. The students would be able to observe the instructors performing them in real time and can address any questions immediately, since these concepts are completely new to them. The mean scores for height and weight measurements in the bedside group showed only a slight rise, and the p values did not reach statistical significance. These two measurements are fairly straightforward, and the children are likely to cooperate.

The video group achieved superior performance on four of the parameters in the OSCE test administered a week later as a surprise test, although the differences were not statistically significant. Research by Shirly Kurian produced similar results where the video group fared well in the retention test. [4] Another article published by Hemant Sharma also showed that video - based learning had better long-term retention .[14] Another review by Komal Srinivasa echoed similar finding.[8] Our research inferred similar conclusion highlighting the power of visual learning. Video can capture multiple senses. This multisensory experience aids students in retaining the facts. The simplification of intricate ideas and the adaptability of the learning process also contribute to improved retention.

Examining students' views on video instruction, most of them felt it was time-saving (83%) and served as superior revision tool (80%). A publication by Abdulaziz Z Alomar revealed similar opinion by the students.[15] An assessment among undergraduates at the Harvard Medical School and the Harvard School of Dental Medicine pointed out that video-based learning was preferred for its efficiency and capability to save time.[16] Another article on the impact of educational videos in medical students' learning concluded that exam performance was enhanced by watching instructional videos.[17] In contradiction, only 7% of our

study participants concurred that they felt confident during exams after video teaching. Exploring the feedback on bedside teaching; most students indicated it was engaging and interesting (97%). Similarly, a study conducted in a Jordanian tertiary hospital concluded that students felt face-to-face learning as engaging and interactive.[18]

Limitations of the study

The research was conducted in a single department within one institution and included only students from a single phase. This may limit the generalizability of the findings. The duration for administering the retention test was quite brief (one week), which may result in inaccurate findings. Perception data relied on self -reported Likert scale responses which can be influenced by individual bias.

CONCLUSION

The study concluded that bedside teaching was a better method compared to video teaching to demonstrate anthropometric parameters to medical undergraduates. Immediate assessment showed statistically significant differences (p value <0.05) between the two groups. Retention studies done after one week showed better scores in the video teaching group but it was not statistically significant. Students favored bedside teaching for demonstrating clinical skills as 97% of them considered it engaging and interesting whereas only 17% stated the same for video instruction. Video based learning was mainly perceived as time-saving and as revision tool.

Video teaching can solely enhance or supplement traditional teaching techniques. It cannot substitute bedside demonstration especially for training complex clinical skills for the beginners. Blended instruction incorporating both the methods is preferred. As video teaching serves the purpose of good revision tool, educators can make instructional videos and share with the students for enhancing the learning outcomes.

Declaration by Authors

Ethical Approval: Approved

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Conflict of Interest: The authors declare no conflict of interest.

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