



Evaluation of undergraduate medical students' preference to human anatomy practical assessment methodology: a comparison between online and traditional methods

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Abstract

Purpose COVID 19 pandemic has brought crucial changes in the field of medical education. Ad mist university examinations in India medical schools have switched to online assessment methods to avoid student gatherings. In this context, we conducted online anatomy practical evaluation and we have aimed at quantifying the students' experience on virtual assessment.

Methods A total of 250 first year MBBS students appeared for online anatomy practical examinations. Immediately after the completion of exams electronic feedback about their experience, in questionnaire format was obtained after getting informed consent. Their feedback was analysed and quantified.

Results Completed feedback forms were submitted by 228 students. More than 50% of students favoured online anatomy spotter examinations. Only 32.8% of students were comfortable with soft parts discussion using images. For image based viva voce 61.4%, 80% & 82% of students responded that the features and orientation of osteology, radiology and embryology images, respectively, were good. For surface marking 55% of the participants preferred online verbal evaluation. Finally, more than 60% of the students preferred the conventional over online assessment methods.

Conclusions The inclination of students' preference for traditional anatomy examination methods mandates adequate training of both students and teachers for virtual examination. The superiority of conventional anatomy practical examination methods is unbiased but pandemic situations warrant adequate preparedness. In the future the anatomy teaching and evaluation methodology in Indian medical schools have to be drastically reviewed in equivalence with global digitalization.

Keywords Anatomy · Education · Students · COVID 19 · Feedback · Examination · Virtual teaching

Introduction

The expeditious spread of COVID-19 pandemic has seen unprecedented changes in economic, social and educational sectors globally. The field of medical education has seen swift changes with implementation of exclusive distant learning [3]. Online innovative education and assessment strategies have become mandatory. In India all educational institutions have been instructed to suspend contact classes by the ministry of health and family welfare, Government of India as a preventive measure to avoid congregation of

students in closed spaces [5]. To step up to these new challenges all medical institutions in India have started using online meeting platforms like Zoom, Go to meetings, Google meets etc. [12]. In this context learning anatomy has completely turned virtual with faculties taking classes using videoconferencing techniques. Anatomy practical education especially is facing a lot of challenges as the subject per se needs a three dimensional understanding of the structural relations. Traditionally medical institutions in India rely on cadaveric dissection as a significant proportion of Gross anatomy teaching [4]. Osteology demonstrations are done as small group teaching with students appreciating the detailed features on the bone [15]. In microanatomy classes the students are given practical demonstrations of slides under the microscope [9]. Now with remote learning in use for gross anatomy dissection classes, videos & photographs of prosected specimens and pictures from anatomy atlas are used. Videos on bone demonstrations are made and uploaded on

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YouTube. Photographs of histology slides and embryology models are taken and used for the classes [11].

With exclusive online method of teaching in practice now the greatest challenge being faced is how to assess the students. Traditional methods of anatomy practical assessment include steeple chase /bell ringer examination method. In this routine, prosected specimens, radiological images, and bones with pins/markings on specific structures are kept.

Questions are administered to the students on identifying the pin marked structure, its relation, function, blood supply etc. [14]. This is followed by discussion on soft parts and viva voce on radiology, embryology models and surface anatomy. In the current crisis face to face in person assessment was not feasible hence we evaluated through online format. Previous studies describe the comparison between traditional and computer evaluated anatomy practical examinations [8]. In an Indian medical scenario this method of assessment is relatively new hence there is paucity of literature on the students' perspective to this unforeseen and unfamiliar method of evaluation. Therefore, in the present study we aimed at quantifying the students' feedback on online anatomy practical assessment methodology which was delivered to them.

Materials and methods

The current study was performed at Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Pondicherry, India. A total of 250 first year MBBS students appeared for anatomy practical examinations from 12th August 2020 to 14th August 2020. The gross anatomy and histology spotters were administered online. A total of twenty questions were posted on Google forms. In which 15 images were of prosected specimen and five of histology images. Each spotter was timed for one minute similar to the traditional assessment methods. For the discussion and viva voce, the students were divided into groups of 25 per faculty. The practical knowledge was assessed by the respective faculty on ZOOM platform. To avoid overlapping of slides and questions, on each day of examination, a new set of PowerPoint presentation was used. These included photographs of prosected specimens, anatomy atlas [1, 10] bones, X-rays and embryology models. Surface marking was asked randomly. The respective group of students were given login ID of Zoom platform and kept in the waiting room. Then they were called for viva voce one by one with video on for face to face interaction. The PowerPoint presentation was shared with them for assessment. Figure 1 describes the standard operating procedure for practical assessment that we followed. Immediately after completion of the exams, an electronic survey was conducted for getting voluntary feedback from the students on their experience.

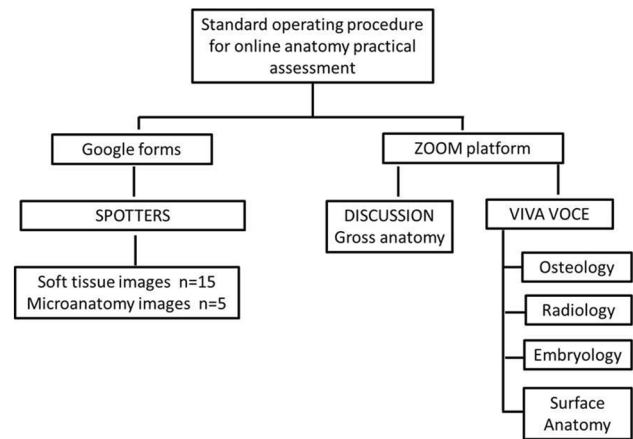


Fig. 1 Flowchart demonstrating the standard operating procedure used for conducting online anatomy practical evaluation

After getting an informed consent the feedback from the students was obtained in a questionnaire format on Google forms. The questions were validated through peer review. Their response was categorised using 5.0 point Likerts scale and analysed. The feedback questionnaire administered to the students is detailed in Fig. 2.

Results

The feedback of the students were obtained for the online practical assessment. Out of 250 students who appeared for online anatomy practical assessment examination, 228 [91.2%] returned the completed feedback forms. Among them 126 students were females and rest were males. The participants belonged to the age group of 17 years–19 years.

Anatomy Spotters examination

Among the students who had submitted the feedback forms 59.6% of them agreed that they were well oriented to the images of the prosected specimen which were given for spotter examination (Fig. 3). Overall 50.3% of them agreed that the pointers and markings on the spotters were easy to identify. The remaining students suggested higher resolution images with pointers to be narrower and sharper for better orientation. With reference to histology slides, 52.2% participants agreed with orientation and clarity of the images. Remaining of them suggested to have various magnifications of microanatomy images for better identification (Fig. 3).

Gross anatomy discussion

For discussion on soft parts each faculty prepared a new set of PowerPoint which was shared on Zoom with one student

Feedback questionnaire administered to the students

Gross anatomy spotters

1. The photographs of the prosected specimens were clear and well oriented.
2. The pointers, markings on the spotters were easy to identify.
3. I would have preferred more time for one spotter than what is given by the traditional in class method.
4. I would have preferred gross anatomy spotters in the traditional method (not online).

Histology spotters

5. The microscopic photographs taken in different magnifications were clear and well oriented.
6. I would have preferred more time for one spotter than what is given by the traditional in class method.
7. I would have preferred histology spotters in the traditional method (not online).

Gross anatomy discussion

8. It was easy to answer to gross anatomy discussion on photographs of specimens.

Viva voce

9. The features of the bones on the photographs and orientation were clear and readily identified.
10. The photographs of x rays were clear and easy to identify.
11. I would have preferred to demonstrate the surface marking on cadaver.
12. The images of embryology models were clear and well oriented.
13. I would have preferred more time than what is given in the traditional in class method.
14. I would have preferred viva voce in the traditional method (not online).

Suggestions:

Any facilitating factor:

Any hindering factor:

Fig. 2 Feedback questionnaire as presented to the participants

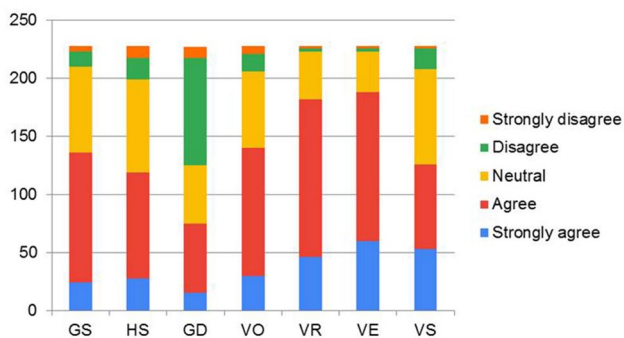


Fig. 3 Bar diagram showing the distribution of students' response to online anatomy practical examination. GS, Gross spotters, HS, Histology spotters, GD, Gross discussion, VO, Viva osteology, VR, Viva radiology, VE, Viva embryology, VS, Viva surface marking

at a time and the discussion was evaluated. The discussion comprised of minimum two slides each of above and below diaphragm prosected specimens. To this only 33% of the students responded that they were comfortable for discussion with the images. The remaining students reasoned that orientation and side determination of the structure in question was very difficult on an image (Fig. 3).

Viva voce

It was conducted for assessment of students' osteology, radiology and embryology knowledge.

For this 61.4%, 80% & 82% students responded that the features and orientation of osteology, radiology and embryology images, respectively, were good for a virtual viva voce examination. But in the case of surface marking only 55%

participants preferred oral evaluation. Rest of the students preferred demonstration of surface marking on cadaver (Fig. 3).

In general the students were asked about their preference for the traditional and online method of practical examination. Overall 68.4% of the participants preferred to have spotters in traditional method and 71.9% of them preferred gross anatomy soft parts discussion in traditional methods. For Viva voce only 39.9% students preferred the conventional method (Fig. 4).

Along with the feedback any suggestions, facilitating and hindering factors were also collected from the students. Among the participants, 5% of them suggested that the images should be of higher resolution for spotters and about 10% of them suggested to increase the time for the spotters which was fixed for one minute per spotter as it is done for traditional method of examination. As facilitating factor 1.3% of the students felt relaxed on online practical examination compared to traditional method of assessment. The hindering factors listed by the participants were about 8.3% of the students faced network issues and 10% of them reported that typing the answers for spotters took more time.

Discussion

Computer assisted learning has been an integral part of medical education for more than five decades [13]. Yet it has not replaced the summative objective structured practical or clinical examination methods in medical schools [2].

In India many medical colleges have a dedicated voluntary body donation program and hence there is adequate availability of cadavers for gross anatomy teaching and summative examinations [4]. With the occurrence of COVID 19 pandemic amidst university examinations physical form of practical examination was not feasible. The online teaching and assessment was conducted within a very short period of time with limited digital resources. This was reflected in

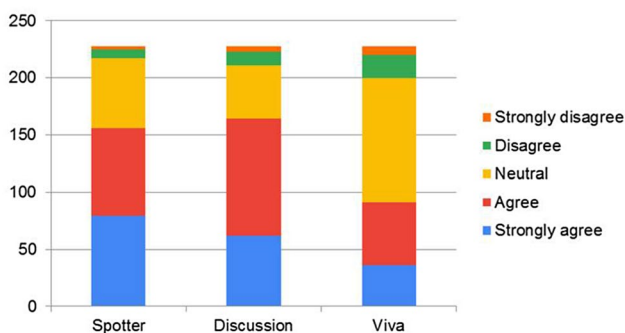


Fig. 4 Bar diagram showing the distribution of students' response to preference for the traditional method of anatomy practical assessment

the feedback responses that the students gave on the practical examinations which we conducted exclusively online. In the present study more than 50% of students responded that they were comfortable with appearing for online gross anatomy and histology spotter examinations with some suggestions like improving the resolution of images and showing histology images in various magnification for better identification. But when it came to discussion of soft parts only 32.8% of students were comfortable with images of prosected specimens. This was because discussion of soft parts requires a good 3 dimensional orientation of the specimen to which the students have been trained the whole year. A sudden transition to 2 dimensional images, where the students cannot feel the structures by hand, made it very difficult for the students to identify the structure, its relations, its vascular supply etc.

For online image based osteology viva voce, 61% students responded they were comfortable. This was marginally less compared to more than 80% students who responded they were comfortable to online radiology and embryology model viva voce. This could be attributed to the assessment methodology to which the students were trained. For osteology viva voce students hold the bones in hand and try to identify the features being asked which is not possible in online examinations. In a similar study Visvasom et al. have demonstrated that video demonstrations could not replace the traditional osteology teaching methods [15]. The embryology models are replica of standard embryology textbook pictures hence majority of the students were comfortable in attending the embryology viva voce online.

Finally when the students were asked about their preferences to traditional or online method of examination more than 60% of them preferred the traditional assessment methods. The results of our study contrasts that reported by Inuwa et al. where they concluded that computer based assessments were preferred by their students [7]. This could be reasoned to the teaching and training methodology followed. In the study by Inuwa et al. they have suggested that paucity in cadaver availability forced them to turn to innovative online teaching methodologies to which the students were trained and then assessed over a long period [6]. This was not the scenario in the present study. The students in the current study were exposed to exclusive online teaching methodology and assessment techniques for a very short period. This could explain their inclination to traditional assessment methodologies.

The current study gives a quantitative and qualitative analysis of students' experience to online assessment methodology. A comparative assessment of their actual performances to their performance in conventional method of examination will help us to identify the areas of lacunae and targeted improvement for future possibilities.

To conclude preparedness for a natural disaster is a necessity. The public health disaster caused by COVID 19

pandemic has taught us that even though superiority of traditional methods of anatomy assessment is unbiased we should be prepared for innovative virtual teaching and assessment methodologies. At the department level prosected specimen photograph bank, microanatomy slides photograph bank should be created and updated regularly. Video demonstrations should also be recorded and stored for future use. Properly structured formative and summative multiple choice question banks should also be maintained by the department regularly. Even though the traditional cadaveric teaching is the method of choice for anatomy education, new innovations in pedagogical practice is the need of the hour. Exposure to virtual anatomy should be made mandatory as a supplement to cadaveric teaching. The field of Medical education is experiencing a huge digital transition.

An alternative to all its future aspects will be online or virtual. The answering or documentation is going to be in soft copies. So the authors suggest a minimum qualification of typing skills could be added as a mandatory module in under graduate curriculum.

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Compliance with ethical standards

Conflict of interest The authors have no conflict of interest to declare.

Ethical approval The study was performed in accordance with the ethical standards of the institutional ethical committee.

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