STUDENTS’ PERCEPTIONS ON CADAVERIC PAINTING AS A METHOD FOR LEARNING SURFACE ANATOMY

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ABSTRACT

Background: Surface anatomy has become very important in anatomy education in the recent decades. The main reason is that surface anatomy forms an obvious connection between basic gross anatomy and clinical practice, as it is the basis for physical examination. Learning methodologies used for surface anatomy includes practicing with cadavers, body painting, peer examination, living anatomy model etc. Live Body painting is an efficient learning tool which mainly helps the visual and kinesthetic learners. It also makes the students relaxed to have a fun filled way of learning which provided some relief to the students from text books. Due to various ethical, cultural and religious reasons live body painting could not be done for all regions in our setup, hence it has been modified as a cadaveric painting in the study. Earlier the method of learning the surface anatomy on cadavers required the student to put in lot of efforts on memorizing the landmarks by surrounding the cadaver during the surface anatomy classes. The aim was to introduce the cadaveric painting to learn surface anatomy which forms the basis for physical examination in clinical practice.

Objectives: To evaluate the students’ feedback concerning their perception on the various aspects of cadaveric painting as a mode of learning surface anatomy and to evaluate the difference in the marks obtained by these students in surface marking in III internal (participated in cadaver painting) and those who haven’t participated in the study.

Materials and methods: Eighty four, first year MBBS students were selected on voluntary basis to do cadaveric painting for the surface marking learning activity of abdominal region. Anonymous feedback regarding their perception of various aspects of cadaveric painting as a mode for learning surface anatomy through questionnaire was done. The mean rating for each item was calculated. Analysis done with SPSS version 16.

Results: Majority of students were positive about using cadaveric painting for surface anatomy. Ninety three percent felt it was a powerful learning, 100% felt it motivated, and helped during exams. There was a significant difference in marks between the groups.

Conclusion: Students perceived that cadaveric painting promoted meaningful learning and understanding of surface anatomy.

KEY WORDS: Anatomic body painting, surface anatomy, learning surface anatomy.

INTRODUCTION

Anatomic Body Painting (ABP) originally emerged as a branch of artistic body painting outside of North America. J.W. Op Den Akker et al published the first scholarly article detailing the use of ABP as an anatomic educational tool in 2002 in...
In a study by Natalie, twenty-six anatomists participated worldwide and critically analysed, the efficacy of body painting, the promotion of knowledge retention and recall and the considerations and practicalities regarding the use of body painting as a teaching tool. They concluded that body painting helped in promoting knowledge retention and recall, particularly learning through the process of cognitive load due to combining the use of color and kinesthetic learning with anatomical theory [10]. Overall the anatomists appreciate body painting as an effective, enjoyable, engaging and cost-efficient adjunct to the multimodal anatomy curriculum [10].

Surface anatomy is defined as the anatomical structures or features that are identifiable on the outside of the body as surface projections [11]. These might include, for example, bony landmarks, any structure or musculature. An understanding of the surface anatomy and markings of the body is imperative when introducing clinical sciences. “Living Anatomy” authored by Burns and Colenso, which was the collection of 12 male and 8 female illustrations, depicting muscles painted on the body, were used in different actions and activities like kneeling, boxing, rowing, fencing, dancing and running were also used for teaching [12]. Ganguly [13] describes an obvious connection formed between basic gross anatomy and clinical practice through surface anatomy, as it is the basis of physical examination [14].

The medical council of India (MCI) in its ‘Vision 2015’ document also emphasized the need for early clinical exposure (ECE) [15]. This document recommended increase in use of active methods of learning such as group discussion, seminars, role play, field visits, demonstrations, peer interactions etc. which would enable students to be a competent Indian medical graduate [15].

Surface Anatomy, even though it is important for clinical examination of patient like palpation of abdominal organs, hearing the respiratory sounds in various parts of lungs, hearing the heart sounds in various areas, Students don’t realize its importance in the first year. The students generally find it difficult to memorize the landmarks for surface anatomy. The challenge faced by anatomist is to teach more anatomy in
less time available, so we must take innovative steps where we can provide opportunities for students to learn anatomy actively with a clinical base and fun-filled manner so retention will be there for a longer time. With this background the aim of the study was to introduce cadaveric painting as a mode of learning surface anatomy which forms the basis for physical examination in clinical practice and the objectives were to evaluate the students’ feedback concerning their perception on the various aspects of cadaveric painting as a mode of learning surface anatomy and to evaluate the difference in the marks obtained by these students in surface marking in III internal (participated in cadaver painting) and those who haven’t participated in the study.

MATERIALS AND METHODS

After obtaining ethical clearance from the institutional ethical review board the study was conducted on first year MBBS students. Eighty four of 150 first year MBBS students (forty eight male and thirty six female students) volunteered for the study. They were divided into six groups of fourteen in each. Students were assigned a cadaver to do painting for the surface marking learning activity of abdominal region. They were free to choose the organ/structure for surface marking and plan and prepare among themselves, for which one day was given. They were free to choose acrylic or poster colours and in the presence of the facilitator the students did a team work of cadaveric painting (Figure 1) within a time interval of one hour and then all these students demonstrated their structure’s surface marking to other students.

Anonymous feedback was obtained from the students regarding their perceptions about the various aspects of cadaveric painting after a month, as they completed their internal assessment. The questionnaire has eight items using the likert five-point grading scale. The items were developed based on previous literature[5]. Pilot testing of the questionnaire was done on the first group of students. The reliability of the questionnaire was found to be satisfactory (Cronbach’s alpha of 0.70). The proportion of students who responded in each category for each item was tabulated (Table 1).

The marks obtained in surface marking (out of ten marks) in their third internals by fifty students selected randomly among who participated in the study were compared with that of other fifty students who did not participate in the study, after one month of completion of the cadaveric painting activity. Analysis was done using SPSS version 16.

RESULTS

All eighty four completed the questionnaire. Table 1 summarizes the responses of the students. It was noted that except item no 7, 85% to 99% of students either agreed or strongly agreed to each of the statements in the questionnaire. Four (1, 2, 5, 6) of the statements showed agreement levels of over 92%. Three of the statements (3, 4, 8) showed agreement levels between 80% and 90%. Item no 7 shows 50% of agreement levels and 35% disagreement levels. The mean score of Non-painting group of fifty was 4.53/10 and the mean score of painting group of fifty was 7.07/10. There was a significant difference between the two groups with a p value of 0.001.

![Fig. 1: Cadaveric body painting of structures in the abdomen region.](image)

Figure showing the surface markings of stomach, liver, spleen, kidney, ureter, abdominal aorta and inguinal canal.
Table 1: Results of the Feedback Questionnaire.

<table>
<thead>
<tr>
<th>Q.No</th>
<th>Question</th>
<th>Strongly Agree (%)</th>
<th>Agree (%)</th>
<th>Neutral (%)</th>
<th>Disagree (%)</th>
<th>Strongly Disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Painting anatomical structures on to the surface of the skin is a powerful method of learning surface anatomy.</td>
<td>78 (92.85)</td>
<td>-</td>
<td>6 (7.14)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Did this session stimulate your interest in surface anatomy?</td>
<td>54 (64.28)</td>
<td>30 (35.71)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Session were interactive</td>
<td>60 (71.42)</td>
<td>12 (14.28)</td>
<td>12 (14.28)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Do you think this approach is useful as an aid for learning the clinical relevance of anatomy?</td>
<td>54 (64.28)</td>
<td>18 (21.42)</td>
<td>12 (14.28)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Promoted team based /peer learning</td>
<td>48 (57.14)</td>
<td>30 (35.71)</td>
<td>6 (7.14)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Helped in recollecting the surface markings during the internal exam</td>
<td>42 (50)</td>
<td>42 (50)</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>7</td>
<td>Would have volunteered as a model for live body painting of abdominal surface marking</td>
<td>24 (28.57)</td>
<td>18 (21.42)</td>
<td>12 (14.28)</td>
<td>24 (28.57)</td>
<td>6 (7.14)</td>
</tr>
<tr>
<td>8</td>
<td>Cadaveric painting to be continued for further batches</td>
<td>72 (85.71)</td>
<td>12 (14.28)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2: Comparisons of results of our study with other studies [5,18,19,21].

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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body painting sessions were interesting &amp; enjoyable</td>
<td>98.7</td>
<td>83</td>
<td>73</td>
<td>78</td>
<td>99.99</td>
</tr>
<tr>
<td>2</td>
<td>Body painting sessions were interactive</td>
<td>98.7</td>
<td>92</td>
<td>-</td>
<td>-</td>
<td>85.7</td>
</tr>
<tr>
<td>3</td>
<td>ABP is a useful tool to learn surface marking</td>
<td>96.1</td>
<td>83</td>
<td>59</td>
<td>96</td>
<td>92.85</td>
</tr>
<tr>
<td>4</td>
<td>To be continued for further dissections</td>
<td>-</td>
<td>79</td>
<td>-</td>
<td>-</td>
<td>99.99</td>
</tr>
<tr>
<td>5</td>
<td>Retention is good</td>
<td>98.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
</tr>
</tbody>
</table>

DISCUSSION

The cadaveric painting method which was used to learn the surface and the clinical anatomy was well accepted by our students as an effective method to learn the surface anatomy and its clinical relevance. The visual images increased their memory of the landmarks. The students also commented that the use of painting while they learned from a text, required a lot of concentration and understanding and this transferring of the knowledge into paintings helped them in deep understanding as well as retaining the gained knowledge over a longer period of time. Our study was compared to other studies and is summarized in Table 2.

One hundred and thirty-three preclinical medical students participated in 24 focus groups at Durham University. Focus groups were conducted to ascertain whether or not the medical students found the body painting of the anatomical structures to be an educationally beneficial learning activity. The data were analyzed and five principal themes emerged: body painting as a fun learning activity, body painting as promoting the retention of knowledge, the factors which contributed to the memorability of the body painting, removal from the comfort zone, and the impact of the body painting on the students’ future clinical practice [4]. Our study also revealed almost the same effects like the students found this an enjoyable and fun filled with lot of interaction between peer group and also accepted this not only as a tool to learn surface anatomy but also wanted this activity to be continued for the future batches too.

Komala, studied body painting exercises for the students to learn the surface anatomy of certain regions in physiotherapy and dental students [5]. This study concluded with the result as 98.7% of the students agreeing that the body painting method of learning the surface marking was interesting. 98.7% agreed that they actively participated in the body painting sessions. 96.1% felt that painting on each other
facilitated a peer to peer learning and 90.9% agreed that body painting gave them the feel of the landmarks and various structures[5]. 98.7% felt that the retention of knowledge was better when it was learnt through body painting. These results were almost similar to our study (Table 2) Claudia Diaz, James Cook University opined body painting has become the most popular technique, as it is a very engaging way for students to learn anatomy and he developed the “Anatomical Man/Woman” projects where student artists and photographers fully body painted student models and enthused their Prime Minister to such an extent that she body painted with them during her visit. She found the experience “a very innovative and entertaining demonstration.” The Anatomical Man projects both inspired and enthused students immensely as they witnessed how engaging and beautiful anatomical body painting can be. [16].The 2010 survey found 83% of health science students thought practical, innovative approaches like body painting assisted their deeper understanding of anatomy, 81% thought they assisted their long-term memory of anatomy, and 82% reported that the learning and memory skills they acquired in anatomy have been useful in other clinical subjects[16].

Bennet in his study with physician assistant programmed students,found anatomy to be a challenging subject tried ABP sessions typically scheduling sessions for a 3-hour block of time after they have completed an anatomic region. Students were divided into teams of three or four with the guideline that each team should have at least one “canvas,” one painter, and one researcher. For example, one topic might be “paint all the structures that are important to understand when one is performing a cricothyrotomy,” or “paint the brachial plexus and be able to demonstrate the causes of an upper plexus injury and a lower plexus injury”[2].

The session concludes with group presentations of their work, including explanations about the development of the structures depicted, their function, and potential pathophysiology. This resulted in a new level of achievement among the student groups and gave students new insight into how to approach human anatomy[2].

Fifty second year medical students were engaged in a painting session where the surface markings of the lungs, liver and heart on the thoraces of their consenting peers were done. These sessions were uniformly enjoyed by students, with significant improvement in their mean confidence for clinical examination skills and surface anatomy knowledge. Moreover, students found the session highly useful and derived a lot of pleasure form the experience[17].

In a study on pre clinical students of 48 control and 48 experimental group, the group who were engaged in painting the muscles, nerves and vessels of hand were evaluated for short-term and long-term retention of knowledge using a set of multiple-choice questions immediately after the body painting exercise and 1 month after the exercise, respectively. Analysis of the results showed that the mean scores of control and experimental, there was no significant difference between the scores for each group both immediately after and at 1 month after the experiment[18].

Of the 120 responded in 2007 batch, around 65% found the sessions both enjoyable and a valuable learning tool which is slightly higher than the 2005 cohort (Table2) who had less extensive use of the method of teaching and who did not use the method in potentially sensitive body areas such as femoral triangle and upper torso. Learning is supported through a variety of means. At the neurological level, the act of body painting, is encoded by the brain through multiple modalities like, reading and reflecting on the anatomy instructional text, and then implementing it through haptic movements; the use of active colour as a signifier and through sensation as in ‘experienced touch’. Information more encoded is also retrievable[19].

In a study in Spain ,189 first-year medical students enrolled to do the body painting as an alternative tool for learning surface and clinical anatomy [20]. All most all the participants recommended this activity for classmates in future courses as in our study. The students when asked about volunteering themselves as model for body painting activities around 35% disagreed due to their inhibition and shyness. Hence in future planned for a live body painting activity with tight-fitting clothes on them to over-
come the embarrassment of the students.

Limitations of the study are the sample size is small-being a pilot study. It was done only for abdominal region there would be differences if done for other regions and the results would be influenced by voluntary participation and on gender basis too as 48 boys and 36 girls took part in the study. Moreover it is a time consuming activity.

CONCLUSION

The cadaveric painting activity was successful in achieving its objectives. The students felt that the body painting method was fun and lots of peer learning happened. While doing body painting, they could actually get the feel of and the relationships between the various anatomical structures. It is clear that use of art in medical education is a highly memorable tool for learning also. When used along with dissection in anatomy classes, these innovative approaches appear to provide motivation that leads to deeper learning.

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Conflicts of Interests: None

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