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Teaching anatomy using colored models

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Abstract
Anatomy refers to the science of investigating a body's internal structure. The head and neck region is one of the most complex areas featured in the medical gross anatomy curriculum. Present study was conducted in Department of Anatomy, Pt. B. D. Sharma PGIMS, Rohtak. Study was carried out on 200 students of MBBS 1st year, in which two groups were made with 100 students in each group. Hundred students were taught about the bones on colored skull and other 100 students were taught on non-colored skull. Thereafter, a test was conducted via questionnaire. The results were tabulated and analyzed. Group of students taught on colored skull scored >70% marks in the test with <30% wrong answers as compared to the students taught on non-colored skull scored <60% marks in test with 42.5% of the wrong answers. Relations of different bones with each other in colored skull are better retained and give more clarity in understanding anatomy of skull.

Keywords: Colored skull, anatomist, medical students, anatomy learning

1. Introduction
Anatomy refers to the science of investigating a body's internal structure. It is one of the basic sciences in a student's medical curriculum [1].
Teaching of human anatomy has had to respond to significant changes in medical curricula, and it behooves anatomists to devise alternative strategies to effectively facilitate learning of the discipline by medical students in an integrated, applied relevant and contextual framework. In many medical schools, the lack of cadaver dissection as the primary method of learning is driving changes to more varied and novel learning and teaching methodologies [2].
The head and neck region is one of the most complex areas featured in the medical gross anatomy curriculum. The effectiveness of using 3-d models to teach anatomy is a topic of much discussion in medical research[3].

2. Material and method
Present study was conducted in department of Anatomy Pt. B. D. Sharma Post Graduate Institute of Medical Sciences Rohtak. In present study skull was painted with different colors so that each bone could be easily identified. Than proposed study was carried out on 200 students of MBBS 1st year, in which two groups were made with 100 students in each group. Hundred students were taught about the bones on colored skull and other 100 students were taught on non colored skull. Than post learning test was conducted via questionnaire. These questions addressed the relation of different bones to each other present in the skull. Students were given 10 minutes, one minute for each question. Test were scored with a maximum of 10 points. One point was given when the answer was entirely correct. After that result was segregated and analyzed.

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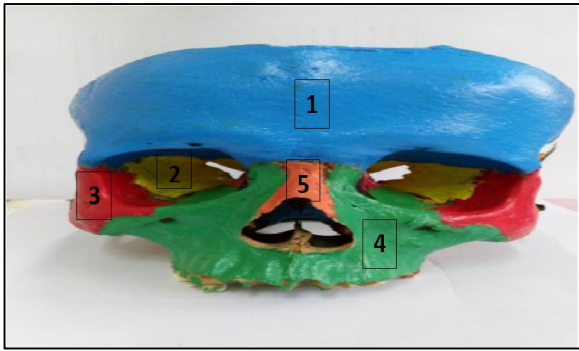
Fig 1: Showing front view of coloured skull. *1. Frontal bone, 2. Greater wing of Sphenoid, 3. Zygomatic bone, 4. Maxillary bone, 5. Nasal bone*
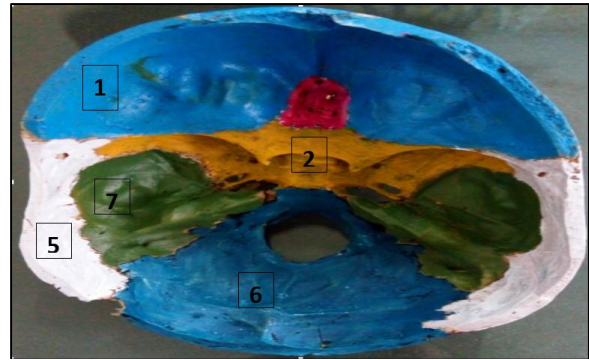
Fig 2: Showing inside view of coloured skull in Fig. 1. *1. Frontal bone, 2. Sphenoid bone, 5. Parietal bone, 7. Temporal bone, 6. Occipital bone*
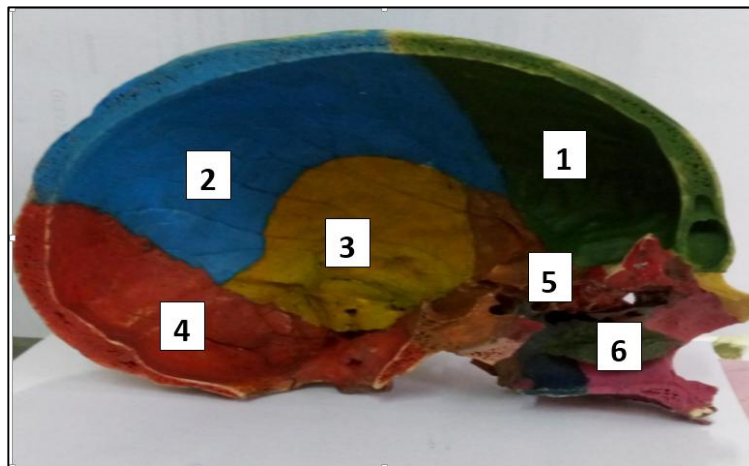
Fig 3: Showing inside view of sagitally cut coloured skull. *1. Frontal bone, 2. Parietal bone, 3. Temporal bone, 4. Occipital bone, 5. Sphenoidl bone, 6. Maxillary bone*
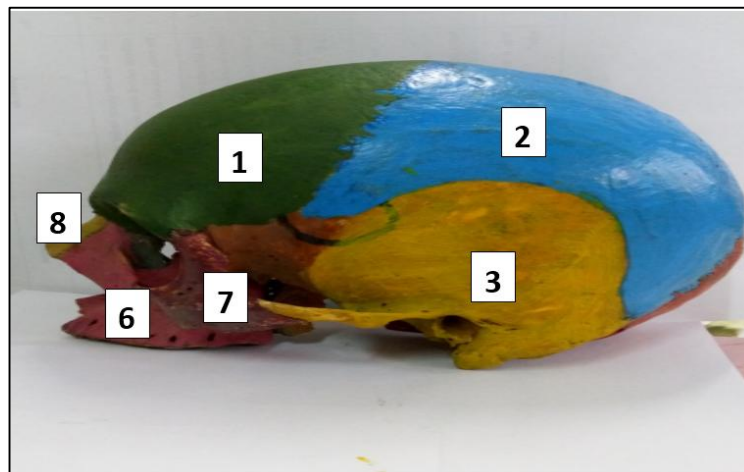
Fig 4: Showing external view of sagitally cut coloured skull. *1. Frontal bone, 2. Parietal bone, 3. Temporal bone, 4. Maxillary bone, 5. Zygomatic bone, 6. Nasal bone*
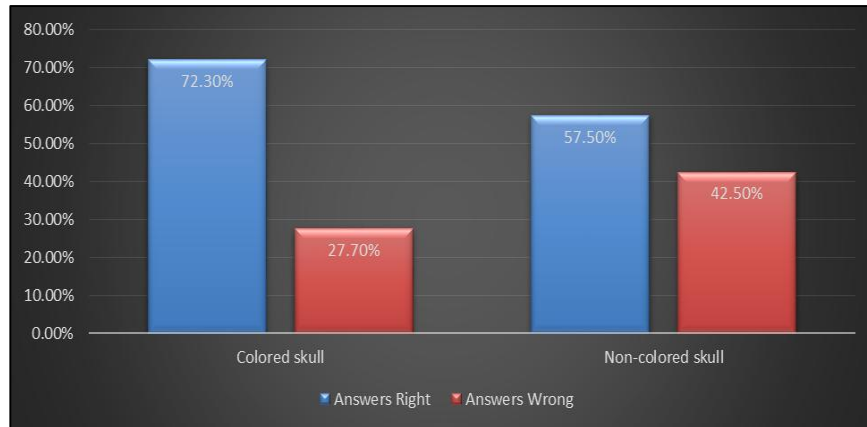
3. Result

The present study was carried out on 200 students in which two groups were made with 100 students in each group. Hundred students were taught about the bones on colored skull and other 100 students were taught on non colored skull. Than post learning test was conducted via questionnaire. After that result was segregated and analyzed.

Table 1: Showing results of the test taken on both the group.

Groups of students studied on	Answers	
	Right	**Wrong**
Colored skull	72.30%	27.70%
Non-colored skull	57.50%	42.50%

Graph 1: Showing the result of the test of the students taught on colored and non-colored skull.

4. Discussion

Anatomy is an essential component of medical education as it is critical for the accurate diagnosis in organs and human systems. The mental representation of the shape and organization of different anatomical structures is a crucial step in learning process [4].

Changes in student's expectations and differences in learning styles between students have prompted novel instructional methods to maximize efficiency [5, 6, 7].

Therefore, the purpose of present study is to assess the way of teaching in which two groups of students were made, each group containing 100 students. Group of students taught on colored skull scored >70% marks in the test with <30% wrong answers as compared to the students taught on non-colored skull scored <60% marks in test with 42.5% of the wrong answers. So present study signifies that colored models are better way of teaching anatomy.

5. Conclusion

Relations of different bones with each other in colored skull are better retained and give more clarity in understanding anatomy of skull.

6. References

1. Prabhu LV, Pai MM, Premchandran D, Vadgaonkar R, Murlimanju BVA. Novel method for coloring and labeling specimens in the anatomy museum. Int J Anat and Res. 2015; 3(2):1165-7.
2. Mc Menamin PG. Body painting as tool in clinical anatomy teaching. Anat Sci Edu, 2008; 1(4):139-44.
3. Cui D, Wilson TD, Rockhold RW, Lehman MN, Lynch JC. Evaluation of the effectiveness of 3D vascular stereoscopic models in anatomy instruction for first year medical students. Anat Sci Edu, 2017; 10:34-5.
4. Pujol S, Baldwin M, Nassiri J, Kiknis R, Shaffer K. Using 3D modeling techniques to enhance teaching of difficult anatomical concepts. Acad Radiol, 2016; 23(4):507-16.
5. Gould DJ, Tersell MA *et al.* A usability study of users perceptions toward a multimedia computer-assisted learning tool for neuroanatomy. Anat Sci Edu, 2008; 1(4):175-85.
6. Gillingwater TH. The importance of exposure to human material in anatomical education a philosophical perspective. Anat Sci Edu, 2008; 1(6):264-6.
7. Reidenberg JS, Laitman JT. The newface of gross anatomy. Anat Rec. 2002; 269(2):81.