Calculation of Difficulty Index of Soft tissue Spotters in Anatomy: An Advance, Novel Method of Assessment in University Examination, A Cross Sectional Study at GMC Jagdalpur Chhattisgarh

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ABSTRACT

Examination is an official test that shows the knowledge and ability in a particular subject. Spotting method of soft tissue of first MBBS student seems to be better than viva form of practical examination. This method of assessment is very easy, simple, less time consuming and an effective method in both formative as well as summative assessment of first MBBS students. This study was conducted on spotting answers of first MBBS 2013-14 batch preuniversity examination in dept. of Anatomy at LSBRKM Govt. Medical College Jagdalpur (C.G.) 50 students of 1st MBBS and 40 spotting questions were selected. Every day 20 questions were kept region wise like extremities-6, Abdomen-5,Thorax-4 and HNF-5 i.e. 20 Questions= 20 marks. Each questions consists of two component. First component of question was concerned with identification (Knowledge) and other component was related with skill and clinical correlate. After using appropriate formulas and software difficulty index were calculated for each questions and their component. Spotting answers >70% correct were easy, <30% correct were difficult. Questions were ranging from Difficult, Good and Easy i.e.00-0.33, 0.34-0.67 and 0.68 to 1.00 respectively. After final calculation it has been found that 16 questions were difficult, 15 questions were good and 09 questions were easy i.e Most of the items were of acceptable (Good) difficulty index (45% to 50%). Easy spotting questions were in reasonable amount (15% to 20%) but difficult questions were also there around 40% to 45%. There were 5% to 10% questions of poor quality which can be improved or should be deleted from question bank.

Keywords: *Examination, Assessment, Spotting, Skill, Clinical correlate, Knowledge, Difficulty index.*

Access this article online	
Quick Response Code:	**Website:** www.innovativepublication.com
	DOI: 10.5958/2394-2126.2015.00019.5

INTRODUCTION

Examination is an official test that shows the knowledge and ability in a particular subject. As per the recent trend in medical education in undergraduate teaching the more emphasis is given on to impart knowledge, attitude and skills to the students, Therefore teaching strategy and assessment plays a very major role in overall student development. In Medical Council India (MCI) 2012 document it has been clarified that teaching should be students centric and the goal is to develop them as Indian medical graduate of first contact physician of the society. Similarly the use of modern education technology in teaching and assessment has also been encouraged by Medical Council India (MCI) 2012 regulation(1) After having constructed and assessed a test, a teacher needs to know how good the test questions are and whether the test items were able to reflect students' performance in the course related to learning(2).We can compare the assessment of practical by spotting method for soft tissue and theory Multiple Choice Questions (MCQs)test. Multiple Choice Questions (MCQs) test are commonly used at the end of an academic session in regular departmental examination(3). Spotter or spotting examination is arranged in 10-20 stations where students rotate in small batches through each station. It involves organs / dissected parts which student has to answer within a specified time frame(4). Students assessment and evaluation are integral parts of the teaching and learning process(5). Currently extensive re-evaluation is going on undergraduate medical education. This is because conventional method of examination is appearing with many lacunae and problems. If we see marking in the examination, only the student variability is considered rather than examiner variability which significantly affects scoring by the students(6).As per Xu and Liu (2009) teachers knowledge in assessment and evaluation is not a static process but rather a complex, dynamic, and ongoing activity(7).Most classroom assessment is very effective which is designed and constructed by teachers themselves(8). There are various method considered for assessment and evaluation like Multiple Choice Questions (MCQs) test, spotting soft tissue, spotting histology slides but feedback from students having passed out

first MBBS examination also serves as an effective tool in developing methodolgy and evaluation methods in undergraduate teaching(9). The present study is a step in bringing about in uniformity and objectivity in the practical examination with several other added advantage along with progressive step towards Objective Structured Practical Examination (OSPE).

AIMS & OBJECTIVES

1. To bring in uniformity and objectivity in questions asked to each student.
2. To minimize the bias in the practical examination.
3. To calculate the difficulty Index.

MATERIALS & METHODS

Data Collection: In this cross sectional study, spotting answer sheets of 50 students of first MBBS in pre-university examination conducted during the June 2014 for anatomy subject at LSBRKM Govt. Medical College, Jagdalpur(C.G.) were checked and analyzed after required approval from the authority of department. Spotting questions were constructed confidentially by experienced senior teachers of department and scrutinized by Professor and Head of Anatomy Department.

40 spotting questions were included in the study out of which every day 20 questions were kept region wise like Extremities- 6, Abdomen - 5, Thorax - 4 & HNF-5,20 Questions = 20 marks. Each question carries one mark. Each question consists of two components. First component of question was concerned with identification i.e. Knowledge and other component was related with skills and clinical correlate.

RESULTS AND DISCUSSION

What is Difficulty Index? According to Wilson (2005), Difficulty Index or Item difficulty is the most essential component of any test analysis(10). Difficulty Index is determined by the number of persons/students who answer a particular test question correctly. It is important for a test to contain questions of various difficulty levels through which we can distinguish between students who are not prepared at all, fairly prepared and well prepared. Formula for difficulty Index (Facility Value) is as under

Difficulty Index (*p*) = C/T
p = Difficulty Index
C = No. of students who answer the question correctly
T = the number of total students.

How to calculate Difficulty index? For example

There are 50 examinee, 30 of whom can answer the question correctly. So that, the Difficulty Index is:

Difficulty Index (*p*) = C/T=30 / 50=0.6 The highest score for *p* is 1.0 and the lowest score is 0. The higher score for *p* means the question is easier. The lower score for *p* means the question is difficult.

Range of Difficulty Index

High Difficulty Index(00 – 0.33): When less than 30% of examinee are able to answer correctly (Question is difficult).

Low Difficulty Index(0.68 – 1.00): When more than 70% of examinee are able to answer correctly (Question is easy).

Middle Difficulty Index(0.34– 0.67): When 50% of examinee are able to answer correctly (Question is good or acceptable)

Tables of difficulty Index shown below.

Department of Anatomy
Preliminary Examination 2013-14
Difficulty Index

Roll No	Name of students	Spotting Questions																																					
		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20	
1	D.Asha Patley	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2	Davidson Shandilya	1	0	1	0	1	0	1	0	0	1	0	0	1	1	0	1	1	1	0	0	1	0	0	0	1	0	1	1	0	0	0	0	1	1	1	0	1	0	1	0
3	Deepak Kumar Jaiswal	0	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0
4	Deepak Patel	1	0	0	1	0	1	0	0	1	1	0	0	0	0	0	1	1	1	0	1	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0	1	1	1	0	0
5	Devendra K. Warkade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Edvina Das	1	0	1	1	1	0	1	0	1	0	1	0	1	0	1	0	1	1	1	0	1	0	0	0	1	0	1	0	0	0	1	1	1	1	1	1	1	1	0	0
7	Gaurav Sharma	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	1	1	0	1	1	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0
8	Harindra Kumar Singh	1	0	1	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	1	0	1	0	1	0	0	0	1	1	1	0	1	0	0	0	0	0	1	1	1	1
9	Harsh Kumar Baghel	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
10	Isha Akshika Bara	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	1	1	1	0	1	1	0	0
11	Jaya Meera	1	0	1	1	1	1	1	0	1	1	1	0	1	0	0	0	1	1	0	0	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0
12	Jennifer Xalxo	1	0	1	0	1	1	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	1	1	1	0	0	0	0
13	K. Sneha	1	0	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Kamal Kedia	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0	0
15	Kanika Sinha	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0
16	Keshav Kumar Hota	1	0	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	0	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	1	0	1	1	0	0
17	Khushboo Goswami	1	1	1	1	1	1	0	0	1	0	1	1	1	0	0	0	1	1	0	0	1	0	1	1	1	0	1	1	0	0	1	1	0	1	0	0	1	1	0	0
18	Khushboo Shah	1	0	1	0	1	1	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	0	0
19	Khushbu Bano	1	0	0	0	1	1	0	0	1	1	1	1	1	0	1	0	1	1	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0
20	Kritika Bist	1	0	1	0	1	0	0	0	1	1	0	0	1	0	0	1	1	1	0	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0
21	Kshama Mishra	0	0	1	1	0	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0	1	1	0	0	1	0	1	1	1	0	0	0	1	1	1	1	1	1	0	0
22	Kunal Kumar Dewangan	0	0	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0
23	Manish Kumar	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	1	0	0	0	1	1	0	0	1	0	10	0	0	0	0	0
24	Manish Kumar	1	0	0	1	1	0	1	0	1	1	1	0	1	0	0	0	1	0	0	0	1	1	1	1	1	1	0	0	1	0	0	1	0	0	0	1	1	0	0	0
25	Manisha Choudhary	1	0	1	1	0	0	1	0	1	1	1	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1	1	1	1	1	0	0
	Total	18	2	19	14	15	15	12	1	16	16	12	8	21	6	7	9	22	19	6	3	19	5	8	8	15	8	20	10	13	4	4	4	11	11	23	14	17	15	3	1
	D.I.	0.72	0.08	0.76	0.44	0.6	0.6	0.48	0.04	0.64	0.64	0.48	0.32	0.84	0.24	0.28	0.36	0.8	0.8	0.24	0.12	0.76	0.2	0.32	0.32	0.6	0.32	0.8	0.4	0.52	0.16	0.16	0.16	0.4	0.4	0.9	0.44	0.68	0.6	0.24	0.04

Department of Anatomy
Preliminary Examination 2013-14
Difficulty Index

Roll No	Name of students	Spotting Questions																																					
		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20	
26	Sager Sachdev	0	0	0	1	0	0	1	1	0	0	1	0	1	0	1	0	1	0	1	1	0	0	1	1	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	1
27	Saurabh Gautam	1	1	1	0	1	0	0	1	1	0	1	1	0	0	0	1	0	0	1	1	1	0	1	1	0	0	1	1	1	1	0	1	0	0	1	1	1	0	1	0
28	Shanti Nandan Minj	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
29	Shivani Thakur	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	Shreya Panda	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0	0	1	1	0	0	1	1	1	0	1	1	1	1	1	1	0	0	1	1	0	0	1	0
31	Srishti Tiwari	0	0	0	0	1	0	1	0	1	1	1	0	0	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0
32	Shristi Ekka	1	1	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0
33	Shruti Choubey	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0	1	0
34	Shubham Prasad	1	0	1	1	0	0	1	0	1	1	1	1	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	1	1	0	0	0	0	0	1	1	0	0	1	0
35	Sonu Kumar Sahu	1	1	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0
36	Subhash C.Bhagat	1	1	0	1	0	0	1	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	0
37	Sunil Kumar Fardiya	1	0	0	0	0	0	1	1	0	0	1	0	1	1	0	1	1	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	1	0	1	1	1	1	0
38	Sunita	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	1	0	1	0	1	1	1	1	1	1	0	0	1	1	0	0	1	0
39	Swati. R.	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
40	Swati Sharma	0	0	1	0	0	1	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	0	1	0	0	0	1	1	1	0	1	0	1	1	1	0	1	1	0	1
41	T. Kumresh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	Tanya Mathrani	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1	0	0	0	1	1	0	0	1	0	0	0	1	1	1	0	1	1	0	1	1	1	0	0	1	0
43	Urvashin Meshram	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	1	0
44	Vaibhav K. Vishakarma	0	0	0	1	1	0	1	0	1	1	0	0	1	1	1	0	0	0	1	0	0	0	1	1	0	0	1	1	1	0	1	0	0	0	1	0	0	1	1	0
45	Vasudev Sen	1	1	0	0	1	1	1	1	0	1	0	1	1	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	1	1	1	0	0	0	1	1	0	1	1	0
46	Ved Prasad Pradhan	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	1	1	0	0	1	0
47	Vidhi Agrawal	0	0	0	0	1	1	0	0	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	1	0
48	Vipin Lakra	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
49	Yatendra Prakash	0	0	0	0	0	1	0	0	0	1	1	1	1	0	1	0	1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0
50	Yogendra K. Patre	0	0	1	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Total		**11**	**7**	**8**	**9**	**11**	**10**	**15**	**10**	**14**	**14**	**18**	**13**	**13**	**11**	**11**	**4**	**8**	**3**	**18**	**13**	**6**	**5**	**14**	**5**	**6**	**0**	**16**	**11**	**15**	**8**	**11**	**9**	**2**	**4**	**18**	**17**	**5**	**6**	**18**	**2**
Difficulty Index		**0.4**	**0.28**	**0.32**	**0.36**	**0.4**	**0.4**	**0.6**	**0.4**	**0.56**	**0.56**	**0.72**	**0.52**	**0.52**	**0.44**	**0.44**	**0.16**	**0.3**	**0.1**	**0.72**	**0.52**	**0.24**	**0.2**	**0.56**	**0.2**	**0.2**	**0**	**0.6**	**0.4**	**0.6**	**0.32**	**0.44**	**0.36**	**0.1**	**0.2**	**0.72**	**0.68**	**0.2**	**0.24**	**0.72**	**0.08**

Final result of soft tissue spotting study at GMC Jagdalpur

Total No. of Spotting Questions	High D.I.	Medium D.I.	Low D.I.	Total
80	32	34	14	80

Knowing Difficulty Index and Its Advantages:

- To improve assessment by revising or eliminating ineffective spotting questions.
- It shows achievement of a given test.
- It gives diagnostic information on what examinees have learned and what they have not learned (11).

Advantages of Soft tissue Spotting method:

This method of spotting is

1) Very easy and simple
2) Less time consuming
3) Having no subjectivity
4) Having uniformity and more objectivity in questions asked to each students
5) Having no fear factor for students
6) Purposefulness can be introduced i.e. wheather it is knowledge, skill and clinical correlate oriented
7) It covers the almost entire course of study.
8) Reliable type of examination
9) Bias between examiners can be avoided
10) It decreases the element of luck(12)
11) Useful to develop a good spotting question bank for future utility.

Pictures of

Calculation of Difficulty Index of Soft tissue Spotters in Anatomy: An Advance, Novel Method of Assessment in University Examination, a Cross Sectional Study at GMC Jagdalpur Chhattisgarh

Fig. 1

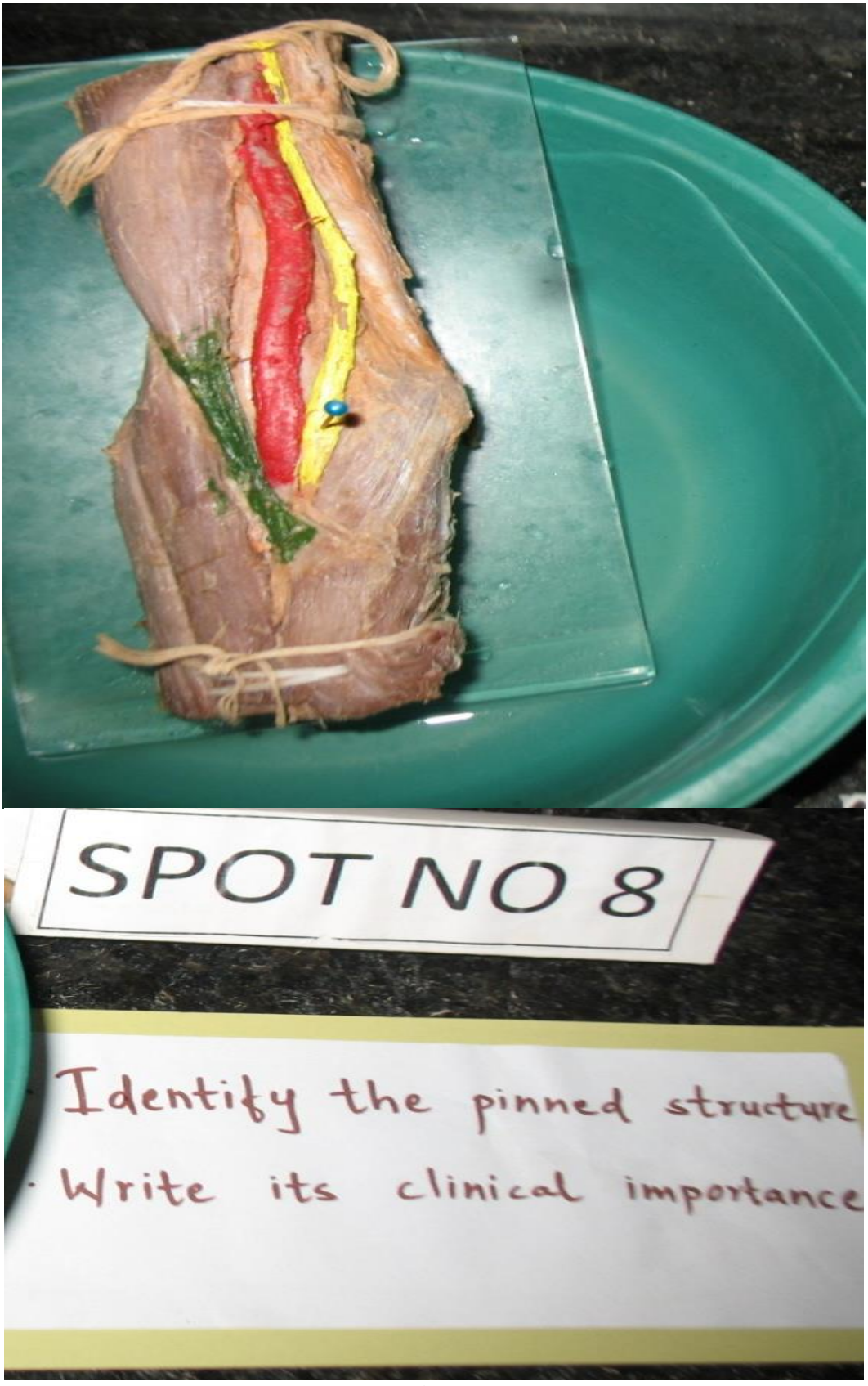
SPOT NO 8
Identify the pinned structure
Write its clinical importance

Fig. 2

Spotters pict……

Fig. 3

Fig. 4


SPOT NO 12
12. Identify the pinned articulation.
. Write its movements.

Fig. 5

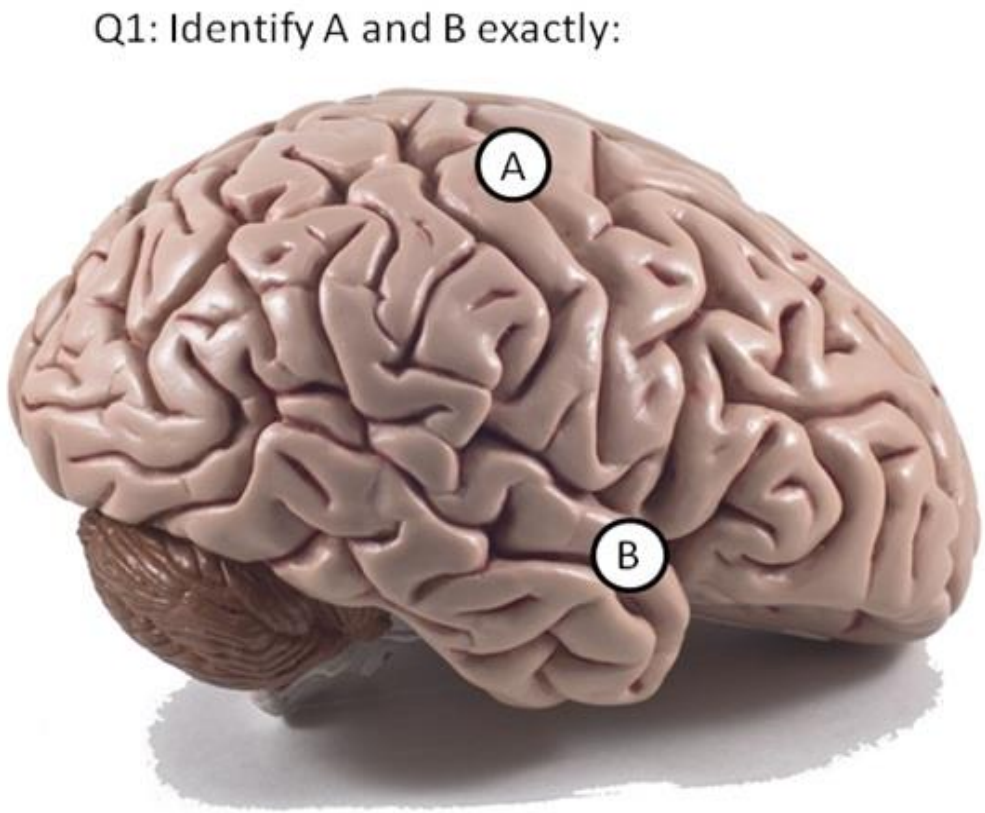
Q1: Identify A and B exactly:
A
B

Fig. 6

CONCLUSION

Soft tissue spotting seems to be a good tool of examination to bring in uniformity and objectivity in the examination. Regular calculation of difficulty index of soft tissue spotting in successive examination can improve practical Examination of first MBBS. Most of the spotting questions were of acceptable(Good) difficulty index (45% to 50%). Easy spotting questions were in reasonable amount (5% to 20%) but difficult questions were also there around 40% to 45%. There were 5% to 10% questions of poor quality which can be improved, reframed or should be deleted from question bank. The present study is a step in bringing about in uniformity and objectivity in the practical examination with several other added advantages along with progressive step towards Objective Structured Practical Examination (OSPE).

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