Original Research Article

Study of the Basic Knowledge of Anatomy Among Phase 1 MBBS Students in Correlation with Their School Curriculum Before the Commencement of the Course

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ABSTRACT

Background and Aim: Anatomy forms the cornerstone of medical education, yet Indian school curricula provide minimal anatomical content. While NEET ensures equitable admission to MBBS programs nationwide, students enter medical college with varying levels of anatomical exposure. This study aimed to assess first-year MBBS students' baseline anatomical knowledge, analyze their initial exposure to anatomy as a formal discipline, and correlate their educational background with fundamental anatomical understanding.

Materials and Methods: An analytical cross-sectional study was conducted among 150 Phase 1 MBBS students on their first day of course commencement. Data were collected through a structured questionnaire administered via Google Forms, assessing demographic details, educational background, prior anatomical exposure, and baseline anatomical knowledge. Variables analyzed included school curriculum board, entrance coaching attendance, parental occupation, and social media influence.

Results: Among 137 participants (mean age 19 years; 58.4% female), 51.5% were CBSE-educated, and 96.2% attended entrance coaching. Anatomical exposure occurred during school (40%), coaching (38.5%), or post-MBBS enrollment (21.5%). Baseline knowledge scores averaged 5.9/10, with significant curriculum-based disparities: ICSE (7/10), CBSE (6.16/10), State Board (5.73/10), and Matriculation (5.61/10). Major knowledge gaps included lymphatic system awareness (63% unaware) and cadaver misconceptions (40%).

Conclusion: Considerable disparity exists in anatomical readiness among first-year MBBS students from diverse educational backgrounds despite uniform NEET-based admission. The study highlights the need for bridging programs or foundation courses to standardize anatomical knowledge before formal medical curriculum commencement, ensuring equitable learning opportunities for all students regardless of their pre-medical educational exposure.

Keywords: anatomy, school curriculum, medical students, undergraduate, knowledge.

INTRODUCTION

India is in the process of producing highly qualified and trained doctors not only for their own country but also for the global health system [1]. The admission process for undergraduate students to obtain an MBBS degree in India is now conducted by the nationwide entrance exam known as the National Eligibility Cum Entrance Test (NEET) [2]. This exam mainly aims to provide equal opportunities to the students nationwide and to prevent dishonesty in the process of medical admission. Eventually, it aims for merit-based admission with a single entrance exam throughout India, even when they are from different boards of school education. The commonest among the curricula or the board of school education in India are the state board, Matriculation, CBSE, ICSE, Anglo-Indian, etc. Each board follows a different syllabus and methodology of teaching. Among the mentioned boards of school, the CBSE board of schooling practices the NCERT syllabus. The syllabus for the NEET examination is from the subjects of biology, physics, and chemistry of the NCERT syllabus. So, it is believed that this will provide more opportunities for the students of the CBSE syllabus to crack the NEET examination and obtain an MBBS admission [3].

At present, the Indian medical education system aims to create a competent Indian medical graduate is highly demanding. Year after year, there are a lot of changes in the curriculum, recommended teaching and learning methods, and improvements in the assessment methods. The MBBS curriculum comprises 4 phases, which include 15 core subjects. The prior knowledge and the exposure to the subject have a great impact on the students [4]. Commonly the initial perceptions of subjects for MBBS students are primarily from senior medical college students. Seniors often share their experiences regarding learning difficulties, study materials, and overall subject challenges. Recent studies acknowledge that this influence is no longer solely from seniors but now also from "multiple sources," implying the growing impact of online platforms and other informal channels [5].

Anatomy, being the main basic science subject for the course of MBBS, is provided with an increased number of competencies in the Phase 1 MBBS. It is important to know how much anatomy a student knows before even entering the course [6]. Knowing this will eventually help in formulating the anatomy teaching and the need for improvisation, and areas to be concentrated on during their course period. Previous studies have analyzed the students on their preparedness towards the students towards MBBS curriculum and their career choices, but not subject-specific on how much anatomy they know, even as a layman [7]. Analyzing their demographic details, schooling data, entrance coaching class details, and putting them to the basic anatomy questions, considering them as high schoolers or even as a layman, we wanted to analyze the basic anatomy knowledge of the Phase 1 MBBS students on their first day of class. So, the present study aims to analyze the first exposure of anatomy as a subject to the students and to correlate their mode of school curriculum with their basic anatomical knowledge, since only a few studies have explored this area.

Aim and objective
- Primary: To analyze their first exposure to anatomy as a subject and to know their fundamental understanding of the subject.
- Secondary: To correlate their board of school curriculum with their basic anatomical knowledge.

MATERIALS & METHODS

It is an analytical cross-sectional study done in Arunai Medical College and Hospital, Tiruvannamalai, Tamil Nadu. After getting clearance from the institutional ethical committee, the study was done among 150 students of Phase 1 MBBS students on their

1st day of commencement of the course. Students who have done other medical allied courses or dropped out were excluded from the study. A pretested set of validated semi-structured questionnaires with closed and open-ended questions was sent to the students in a Google form. The questionnaire had four sections, which included section 1 for demographic details, section 2 for schooling and coaching center details of the students, section 3 with questions on the exposure to anatomy as a subject, and section 4 consisting of questions on the basic anatomical knowledge of the students [Table - I]. Responses were collected in an MS Excel sheet for statistical analysis.

Table -I- Shows the question asked to the students to assess their basic anatomical knowledge

Section IV: Basic anatomical knowledge
1. Which of the following part of the abdomen you think kidney is present in?   Upper part of the abdomen/ lower part of the abdomen/ not sure
2. Name the structure that is attached to the wall of uterus which provides nutrients to the developing fetus.
3. Placenta/ umbilical cord/ not sure   What is the maximum length of an axon?   < 1 meter/ > 1 meter / not sure
4. Where is appendix located?
5. Right side of the abdomen/ left side of the abdomen/ not sure   Have you heard of a term called mesentery?   Yes/ no/ not sure
6. Do you know that the term blood vessel includes both artery and vein?   Yes/ no/ not sure
7. Do you think that mandible is a part of skull?   Yes / no/ not sure
8. What is the upper chamber of heart known as?   Atrium/ auricle/ ventricle/ not sure
9. What is the term used for the growing offspring in the human uterus?   Baby/ fetus/ child/ embryo/ not sure
10. Which of the following structure determine the colour of the eye?   Cornea/ iris/ lens/ retina/ not sure.

RESULT

The participants' average age was 19 years, with 41.6% being male and 58.4% being female. Among the 137 responses, 94.9% (130) agreed to participate in the study. To assess their prior academic background, we asked questions about their education and entrance coaching (NEET coaching, a competitive exam). Among the participants, 51.5% (67) are from CBSE as their upper secondary education curriculum. Then came 32.3% under the state board and 13.8% under matriculation. The remaining 3.1% were educated under the ICSE board of education [Table - II] Most participants (96.9%) used English as their medium of instruction, with Tamil accounting for 3.1%.

Table - II: Shows the relationship between the school curriculum of the student with their quota of admission in medical college.

	CBSE (67)	State board (42)	Matriculation (18)	ICSE (2)
Government	49.25% (33)	59.52% (25)	50% (9)	0
Management	47.76% (32)	38.09% (16)	33.33% (6)	50% (1)
NRI	2.9% (2)	1.49% (1)	16.66% (3)	50% (1)

On questioning the parents' occupation of the students, 10% of them are health care professionals, and the remaining 90% are non-health care professionals.

We also investigated the students' preparation for their MBBS entrance examination. 96.2% have attended entrance coaching. 92.3% of them attended offline

physical classes in the coaching centre. Most students (75-80%) attended 1-2 years of entrance coaching across all curricula. State Board students had the highest 3-year coaching rate (11.90%), while ICSE students showed shorter duration (50% under one year). None exceeded 3 years [Table -III]

Table III: Relation between the mode of curriculum and the number of years of coaching

	CBSE (67)	State board (42)	Matriculation (18)	ICSE (2)
< 1 Year	17.91% (12)	7.14% (3)	11.11% (2)	50%
1 year	38.81% (26)	42.86% (18)	44.44% (8)	50%
2 years	35.82% (24)	38.10% (16)	33.33% (6)	-
3 years	7.46% (5)	11.90% (5)	11.11% (2)	-
>3 years	0	0	0	0

In the next section, the students were investigated on their exposure to anatomy as a subject. All the participants were familiar with the subject of human anatomy. Around 40% of students were exposed to the subject during school, and 38.5% after entering coaching centres for entrance exam preparation. Still, 21.5% of the students learned about the subject only after enrolling in the MBBS course. The idea of the subject was widely presented to them by the teachers of the school and coaching centres.

On discussing the influence of the social media platforms in introducing the subject, 42.3% state YouTube and 20.8% state Instagram are their sources of knowledge. Most of the students were familiar with the subdisciplines of the anatomy such as and less acquainted with surface anatomy and radiological anatomy.

Among the phase I MBBS subjects, 64.6% of them believe that anatomy is the most difficult subject to grasp. All the participants were aware of the term cadaver, yet 40 % of them believed it is contagious. Only 18.5% of the participants had previously visited a human anatomy museum. On questioning their awareness of different systems of the body 63% of the students are not aware of the lymphatic system.

The last part of the questionnaire consists of 10 basic questions on human anatomy. The observation of the responses showed that 25.3% obtained 6 out of 10, which was the average score. Whereas around 5.38% scored zero and 2.30% scored 9 out of 10. There were few questions in which the increased number of participants went wrong [Table - IV].

Table IV: shows the most common question where the participants went wrong and the number of students got it right.

Question	Number of Students Got It Right
Is the mandible a separate bone?	8
Have you heard of a term called mesentery?	24
Maximum length of an axon?	53
Which part of the abdomen does, kidney is located?	62

On correlating the scores obtained by the participants and their school curriculum, we obtained the following results.

Table V: shows the average scores obtained by the students based on their board of schooling.

Curriculum	Average Score for 10
CBSE	6.16
State Board	5.73
Matriculation	5.61
ICSE	7

DISCUSSION

Demographic and schooling analysis: Considering the need to know the basic anatomical knowledge of a phase 1 MBBS student, the questionnaire, consisting of demographic details, schooling details, questions on their view of the subject, and basic anatomical questions, was analyzed. The average age of the students who responded was 19 years. Even though the

students had finished their high school in 17 years, they had spent around 1 – 2 years on entrance exam preparation [6].

Our present study shows that 51.5% are from CBSE, 32.2% from the state board and 13.8% from matriculation, and 3.1% from ICSE. A previous retrospective study has analyzed the significance of the outcome of the MBBS students with the NEET performance and their board of study. Among their participants 84.8% were from state board and 15.2% from CBSE. However, the results showed that NEET mark did not have significant predict on their outcome [8].

A study conducted on the preparedness and awareness regarding the MBBS course analyzed the percentage of students having health care professionals in their family, showing 95% of them had a relative from a health care background, which can have an impact on the student [6]. In our study, 10% students' parents were healthcare professionals. Having a health care professional could give the students' academic and clinical guidance, enhance their understanding of the medical topics, and improve their professionalism and ethical development [9].

A study analyzed the significant relationship between the emotional regulation and goal setting among NEET aspirants gives evidence that there has been a strong difference between the students from state board and CBSE in the aspect of goal setting (mean value of state board - 60.98, CBSE – 68.77) but not in their emotional regulation (mean value of state board - 41.9, CBSE – 43.68) [10]. Our study reflects that 96.2 % of the students have undergone an entrance coaching class either in an online or offline mode. Students from the state board and matriculation required at least 1 year or more years of coaching to pass the exam, whereas 17.9 % of the CBSE students were able to get admissions in their 1st attempt [8].

Exposure to anatomy: While anatomy is the foundational subject, the pathway through which the students encounter it before MBBS is diverse. School and entrance coaching classes play a major role in its early exposure. Previous studies have expressed that the social media platforms could positively affect anatomy education, but the educational values they provide are a matter of concern [11]. Further, the students of the present study also underscore that YouTube (42.3%) and Instagram (20.8%) are the social media platforms that act as a supplementary learning resource even before the formal medical education begins.

The present study suggests that the difference in knowledge of several anatomical sub-disciplines indicates potential focal points for pre-medical and early MBBS courses to enhance foundational understanding from the beginning.

A very high percentage of 64.5%, indicating a widespread sentiment among first-year students that anatomy is the toughest subject to master. Although 40% were aware of a subject named anatomy in school and 38.5% in coaching, the 21.5% who only encountered it after entering MBBS indicates a limited prior exposure. Significantly, 40% of students harbor the misconception that cadavers are contagious due to their lack of exposure and societal influence, and unscientific portrayals in the media.

Basic anatomical knowledge:
The last section of the questionnaire provided a valuable quantitative insight into the actual anatomical knowledge base of the Phase 1 MBBS students and correlated it with their prior educational backgrounds. An average score of 6 out of 10, achieved by 25.3% of participants, suggests a moderate foundational understanding of basic human anatomy. The presence of 5.38% scoring zero is concerning. This group likely had very minimal to no effective prior exposure to anatomy, or struggled significantly with the foundational concepts. Conversely, 2.30% scoring 9 out

of 10 indicates a small segment of students with a strong pre-existing anatomical knowledge base, likely due to self-study, excellent prior schooling, or dedicated coaching.

The present study on correlating the average score of the basic anatomy question of the participants' school curriculum shows that the CBSE students have a mean score of 6.61, which is above the average score obtained by the participants. Whereas the state board and matriculation board students have obtained 5.73 and 5.61 as their average score, which is less than the CBSE board students. Among the participants, we had only 2 students from the ICSE board, and they scored the highest average score of 7 out of 10, but since the number of participants is too low, the significance of their scores cannot be considered. This report has revealed significant and concerning gaps in the foundational human anatomy knowledge among surveyed students at the secondary school level.

CONCLUSION

The data prove that the board of schooling, entrance coaching, occupation of the parents, and the influence of social media affect the students' exposure to anatomy learning. Differentiation in scores on anatomical knowledge highlights a potential disparity in readiness for the MBBS anatomy curriculum among students from various educational backgrounds. Medical colleges in India, given the diverse educational backgrounds of their admitted students, should take note of these findings. Understanding these variations can help institutions tailor their early anatomy teaching strategies to bridge these gaps, ensuring that all students have a robust foundational understanding of human anatomy, irrespective of their pre-university schooling board. This could involve diagnostic assessments upon entry, targeted bridge courses, or differentiated learning resources to support students from curricula that provide less prior exposure.

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