

First-Year Anatomical Knowledge Acquisition in Indian Medical Students



NKP Salve Institute
of Medical Sciences
& Research Center,
Nagpur, INDIA

Dr. Sneha Mahalpure¹, Dr. Deepali Onkar¹, Dr. Raj Narnaware^{1,2*}, Dr. Sarah Cuschieri³

1*. N.K.P. Salve Institute of Medical Sciences & Research Center and Lata Mangeshkar Hospital, Nagpur, INDIA (NKPSIMS)

2. Department of Nursing Foundations and Science, Faculty of Nursing, MacEwan University, Edmonton, Alberta, CANADA

2. Department of Anatomy, Faculty of Medicine & Surgery, University of Malta, Msida, MALTA



Research Gaps

- The human anatomy is considered a cornerstone of health care disciplines and serves as a pre-requisite for subsequent years of medical, allied health and nursing theory courses and clinical (Young et al., 2016).
- Teaching and learning of anatomy are influenced by several factors such as student demographics, prior knowledge of science/biology, health care discipline, number of teaching hours, cadaver labs and various teaching modalities (Narnaware, Y. 2021; Narnaware and Neumeier, 2021).
- Moreover, numerous studies have expressed concern over students' ability to acquire adequate anatomical knowledge in the first year and successfully transfer, retain, and apply it throughout their program (Narnaware and Neumeier, 2020; Narnaware, Y. 2021).
- However, there are limited studies focused on the evaluation of anatomical knowledge acquisition in Indian medical students in their first year and its retention in the subsequent years of medicine, allied health and nursing disciplines (Pandey et al., 2024).

Study Objectives

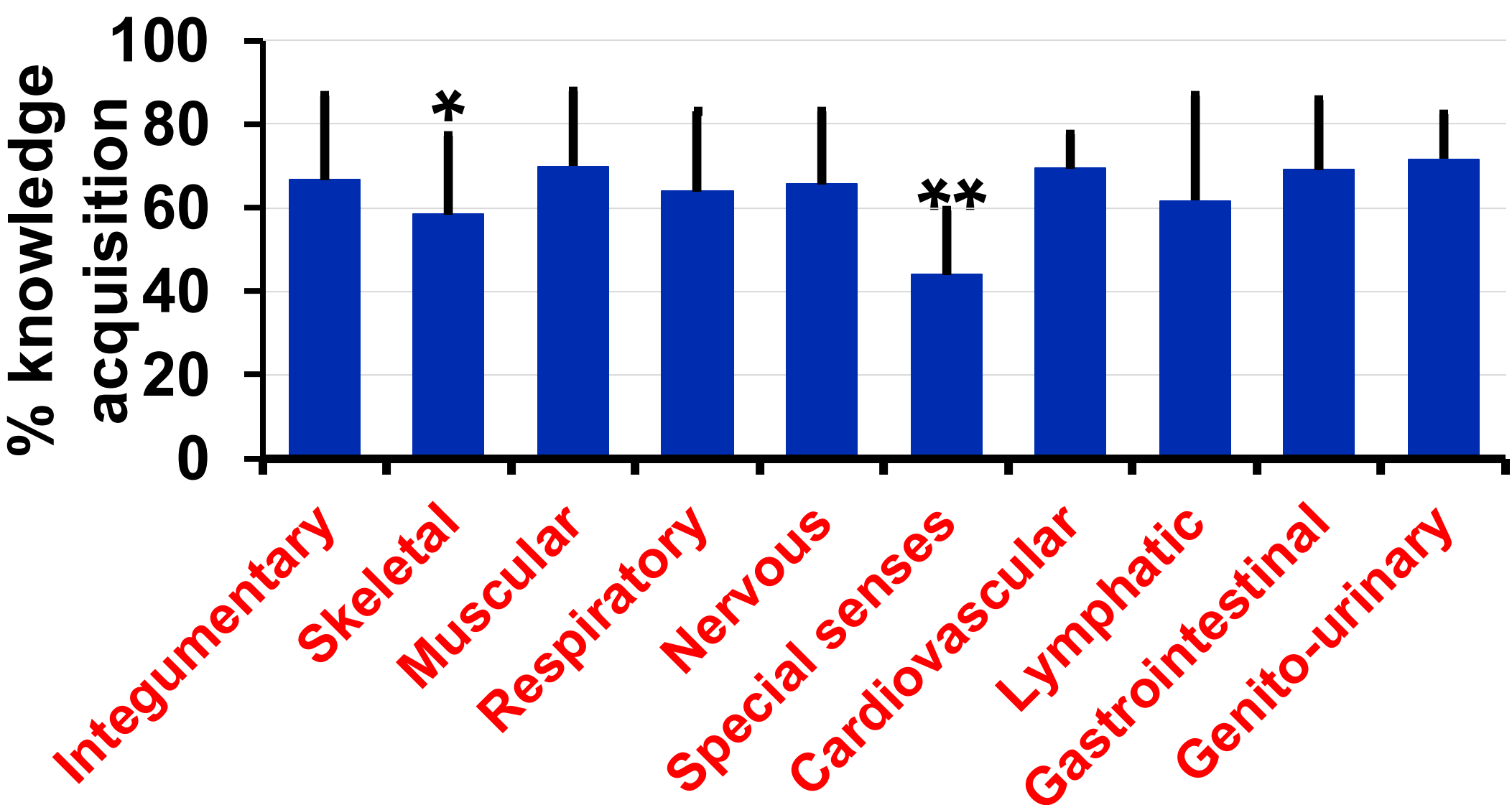
- As a part of sabbatical leave from MacEwan University, Canada and international collaboration with NKPSIMS, this study aims to evaluate anatomical base knowledge acquisition of body's major organ systems in first-year MBBS students, with the future objective to assess how much anatomical knowledge these students will then transfer/lose, retain and apply in the senior years of their medicine program.

Methods

- The present study was conducted in the Fall 2023 semester at NKPSIMS with one section of 200 anatomy students in first-year MBBS class.
- Quizzes were created using an online quizzing platform called Kahoot (Kahoot Inc., Oslo, Norway).
- First-year anatomy students were quizzed on the ten body's major organ systems (Table 1).
- Each Kahoot quiz/organ system included 9-11 knowledge and comprehension level multiple-choice questions.
- The students were encouraged not to study for these quizzes in advance.
- Data were statistically analyzed using SPSS II, and means were compared using t-tests. The scores are described as the mean and standard deviation (SD). Statistical significance was set at $P \leq 0.05$.

Results

- The results show that anatomical knowledge acquisition was organ system-specific and varied from one organ to another (Figure 1 and Table 1).
- The mean score of all questions from ten organ systems in year one was 64.04 ± 8.2 ($\pm$ SD).
- The organ systems with the highest knowledge acquisition were genito-urinary (71.7%), muscular (70.0%), cardiovascular (69.4%) and gastrointestinal (69.0%).
- Whereas the skeletal system (58.4%) and special senses (43.9%) showed the lowest knowledge acquisition compared to organ systems with the highest acquisition.
- Other organ systems showed a moderate knowledge acquisition.



Percent (%) base knowledge acquisition by organ system
*, ** compared to genitourinary, muscular, cardiovascular and gastrointestinal systems; $P < 0.05$, $P < 0.001$.

Organ system	% knowledge acquisition
	Mean $\pm$ SD
Integumentary	66.7 $\pm$ 27.9
Skeletal	58.4 $\pm$ 18.7
Muscular	70.0 $\pm$ 17.8
Respiratory	63.9 $\pm$ 19.0
Nervous	65.7 $\pm$ 17.3
Special Sense	43.9 $\pm$ 15.4
Cardiovascular	69.4 $\pm$ 8.0
Lymphatic	61.7 $\pm$ 25.1
Gastrointestinal	69.0 $\pm$ 16.9
Genito-urinary	71.7 $\pm$ 10.8

Data shown as means $\pm$ (standard deviation). Percentage of anatomical knowledge acquisition of individual organ systems in the first year of MBBS.

Discussion & Conclusion

- Base-level anatomical knowledge in first-year students demonstrated fluctuation in knowledge acquisition. This may partly be due to the level of question difficulty of the organ systems.
- While there were organ system-specific variations in knowledge acquisition, this is the first study that evaluated base knowledge acquisition of the body's major organ systems in first-year medical students over a year, compared to others who assessed the knowledge acquisition of limited organ systems and over one semester (Pandey et al., 2024; Cuschieri and Narnaware, 2023).
- This is also in agreement with Google survey results conducted on the same students that 60% of students could remember only 50% and 17% of students could remember 75% of their first-year knowledge a year after (Onkar and Narnaware, Unpublished results).
- Comparatively lower knowledge acquisition of special senses and skeletal system suggests that future modifications in teaching strategies should be considered and/or introduced.
- The results of this study provide the basis for evaluating how much anatomical knowledge these students will lose/transfer, retain and apply to their subsequent years of theory and clinical.

Acknowledgment

- The Principal Investigator (Dr. Raj Narnaware) acknowledges the management's support and permission to use institutional facilities to conduct this international research collaboration.

References

- Narnaware, Y, & Neumeier, M. (2020). Second-year nursing students' retention of gross anatomical knowledge. *Anatomical Sciences Education*,13:230-236.
- Narnaware, Y. (2021a). Never Heard That Before! Bioscience Knowledge Retention in Undergraduate Nursing Education- Current Topics. *HAPS Educator Journal*, 25 (2):77-83.
- Narnaware, Y, & Neumeier, M. (2021b). Use of a virtual human cadaver to improve knowledge of human anatomy in nursing students. *Teaching and Learning in Nursing*,16: 309-314.
- Pandey, SB, Patel, BN, Chourasia, RS, & Kumar, R. (2024). A comparative study of traditional vs. modern anatomy teaching methods on student knowledge retention. *Azerbaijan Pharmaceutical & Pharmacotherapy Journal*, 23 (2):193-199.
- Young JQ, van Dijk SM, O'Sullivan PS, Custers EJ, Irby DM, & Ten Cate O. (2016). Influence of learner knowledge and case complexity on handover accuracy and cognitive load: Results from a simulation study. *Medical Education*, 50:969–978.