

Knowledge of Anatomy: Where Do we Stand?

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ABSTRACT

Objectives: Anatomy education has undergone enormous transformation in the last decade. Traditional topographic anatomy taught by didactic lectures and complete dissection of the body has been replaced by a wide range of special study modules, learning strategies and teaching tools. The present study was designed to provide a snapshot of the working knowledge of anatomy prevalent among Pakistani medical students and residents in this changing scenario.

Study Design: A cross-sectional study conducted through a mini-test questionnaire completed by 325 medical students & junior doctors randomly selected from four different medical institutions of Pakistan.

Results: Among 325 medical students and junior doctors, only 10% were able to identify all anatomical structures correctly, whereas 24% candidates identified =70% anatomical landmarks. Thirty nine percent of the junior doctors and medical students were able to identify =50% anatomical structures. The best anatomical knowledge was reflected by first year medical students whereas the worst performance was shown by residents. There was insignificant variation in the performance of candidates from different private medical schools; however the results of candidates from public sector institution were astounding.

Conclusion: The decay in anatomical knowledge over time portrays that residents would try to fill their anatomy deficiency during surgical residency rather learning surgical skills. The medical educationists should find-out the root cause of this deterioration. We propose a randomized trial using problem solving test items to identify the exact intensity of the problem prevalent among Pakistani medical students and residents.

Key words: Prosections, topographic anatomy, dissection, cadavers, anatomy teaching

INTRODUCTION

Current curricular reforms stress on integrated medical education and holistic patient care.¹⁻³

Traditional topographic anatomy taught by didactic lectures and complete dissection of the body has been replaced by a wide range of special study modules, problem based learning (PBL), case based learning (CBL), computer aided learning (CAL), prosections, plastinated specimens and many other teaching tools.⁴⁻⁵ In many medical schools, dissected cadaver-based anatomy is no longer taught.⁶⁻⁷ There is a great divergence in the teaching of anatomy, the

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educational impact of which has not been reflected in published scientific literatures.⁸⁻¹³ However medical students at all levels of their professional learning think anatomy to be a very important subject for their clinical training.¹⁴ The reduction in undergraduate teaching of anatomy has caused a great concern among undergraduate as well as postgraduate students, especially in surgery. This gave a safe passage to young men and women with poor knowledge of anatomy, to become surgeons.¹⁵⁻¹⁶ Like us, anatomists across the globe are concerned with the deterioration in anatomical knowledge of their trainees.¹⁷⁻¹⁸ The present study was designed to provide a snapshot of working knowledge of anatomy prevalent among Pakistani medical students and junior doctors. The carpal bones and important neurovascular structures in arm were chosen as a benchmark for assessment of anatomical knowledge, considering it clinically relevant to junior doctors in a number of disciplines and being feasible for objective assessment.

METHODS

A snapshot of anatomical knowledge was conducted through a mini-test survey questionnaire completed by randomly selected 325-medical students and residents. This cross-sectional study was completed by random sampling in four different medical schools located in different geographical locations of Pakistan over a period of two months during 2008. An informed verbal consent was taken from all the participants of the study. We grouped the participants of the study into three different categories, i.e, Residents, Clinical and Pre-clinical medical students.

Two separate drawings of hand (Fig. 1) and arm (Fig. 2) with lines for labeling were used. Maximum

fifteen minute time was allowed to label these diagrams in the presence of one of the authors, in addition to other invigilators. The study was conducted as a surprise mini-test questionnaire and the candidates were not allowed to communicate with each other by any means. The residents were chosen at random from general surgery and allied surgical specialties. No prior intimation was given and prospective candidates who knew of the test were excluded from the study, to give fair representation of current knowledge of anatomy as far as possible.

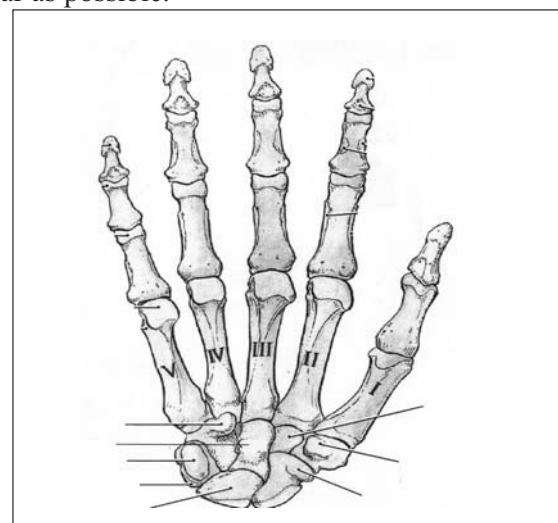


Figure – 1

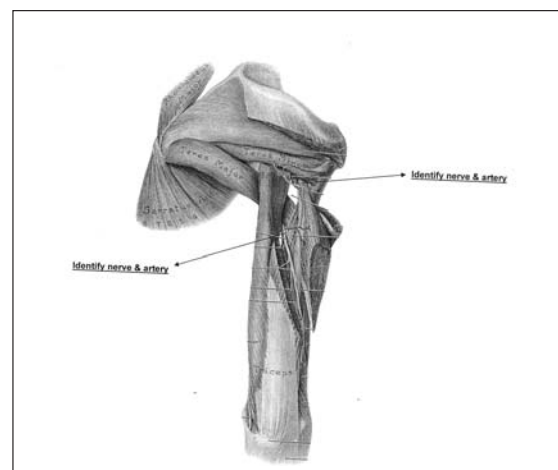


Figure – 2

RESULTS

Among 325 medical students and junior doctors, only ten percent (10%) were able to identify all anatomical structures correctly, whereas twenty four (24%) of the participants identified $\geq 70\%$ anatomical landmarks. Thirty nine percent (39%) of the junior doctors and medical students were able to identify $\geq 50\%$ anatomical structures. Most commonly identified structure was radial nerve (61%) followed by axillary nerve (60%), scaphoid (48%) and lunate (45%) bones. Surprisingly 61% of the participants were unable to identify even half of the structures asked in the mini-test questionnaire. The least identified structure was profunda brachial artery which was identified by 22% candidates only. The least identified bone among the carpals was Triquetrum (26%). Inability to identify the chief artery of the arm (profunda brachial artery), by 78% participants reflects the deterioration in anatomical knowledge of our future physicians / surgeons. Larger and more commonly injured bones were the most recognized by all groups of participants. Trapezium, trapezoid and triquetrum were frequently mixed up. Only one third of the participants were able to identify trapezium as the bone at the base of thumb.

The mean score of public sector medical school was 10.6 as compared to mean score of (5.6702, 5.1250 & 3.3929) for other three private medical schools. The results were analyzed for descriptive statistics and significance among different groups using one way ANOVA. The best anatomical knowledge was reflected by first year medical students whereas the worst performance was shown by the residents (Fig. 3). There was insignificant variation in the performance of participants from different private medical schools, however the result of factual anatomical knowledge of participants from public

sector institution was astounding (Fig 4).

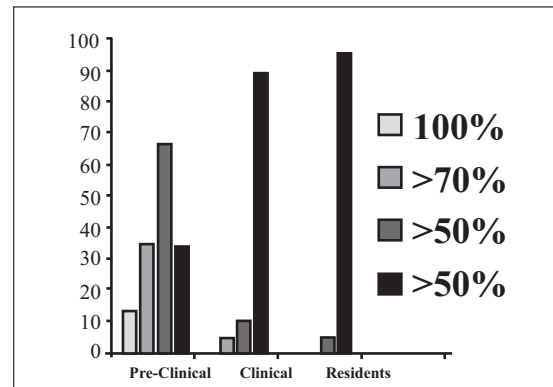


Figure – 3 : Comparison of Anatomical Knowledge of Residents, Clinical & Pre-clinical Students of Shifa College of Medicine

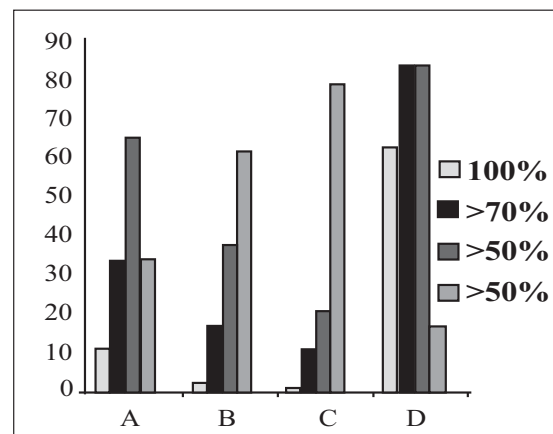


Figure – 4 : Comparison of anatomical knowledge of 1st year Students in different medical schools of Pakistan

DISCUSSION

A sound knowledge of anatomy remains central to the understanding of disease processes and the principles of surgical management.¹⁸ Defining the anatomical site of the lesion is crucial if the physician and surgeons have to resolve the problem effectively and compassionately.¹⁹ Therefore, contextual learning of anatomical knowledge is essential from the very beginning of undergraduate medical education. This can only be achieved by exposing and examining the tissues and structures in situ, best revealed and studied

by dissection.²⁰⁻²¹ Dissection-based anatomical analysis facilitates the classification of body components, the development of vocabulary and 3-dimensional mapping of viscera along with their surface projections, which would be later applied in clinical practice.²²⁻²³ Biomedical informatics and new modalities of imaging have further magnified our knowledge of structural organization. Educating medical students in the principles of anatomy introduces them to the reality of death, concept of biological variations, uniqueness of each patient and instructs them the ways & means of accessing information.

Performance in gross anatomy is a better predictor of performance in the United States Medical Licensing Examination (USMLE) part-1; in comparison to A-level, Medical Colleges Admission Test (MCAT) and GPAs.²⁴ Although the assessment method applied in this study is a crude measure of the factual anatomical knowledge, however, it provides an insight into the level of anatomical knowledge at different stages of training in medical profession and the level of decay in this knowledge over time. Moreover, such studies may be helpful in the identification of “struggling” students whose performance could be improved by timely counseling.

The results of radial & axillary nerve identification were good among all groups and reflected the logical retention of these anatomical structures because of their potential implication in various clinico-pathological conditions. The best anatomical knowledge was reflected by first year medical students whereas the worst performance was shown by the residents. This finding was surprising to the assumptions of the authors. Although, medical students in their final year are preparing for their examinations in clinical disciplines, however, their knowledge of clinical anatomy is also formally tested at that stage. It is therefore, disappointing that none of them identified important anatomical structures in the upper limb. The residents’ score demonstrated the worst performance among all levels of learners.

Anatomy is central to general surgical training as well as allied surgical specialties. Therefore, it is also formally examined in the membership and fellowship examinations. The poor results of residents suggest that deficiency in their anatomical knowledge would be filled during their surgical training. The time available during surgical residency should not be used to learn the relevant anatomy; instead it should be utilized for the training of surgical skills. There was insignificant variation in the performance of candidates from different private medical schools (Fig 4), however the results of candidates from public sector institution were astounding (Fig 4). The variance among public and private institutions may be multi-factorial; linked to available anatomical learning resources, learning strategies in practice, faculty training and learning culture at the medical school; however the different entry stuff (input) for private and public institutions may be a single most important factor responsible for this remarkable difference. Usually, the private medical schools in Pakistan recruit the left-over candidates of the public sector institutions. The decay in anatomical knowledge with advancing professional life is reflective of non-coherent, disintegrated anatomy instruction which promotes rote learning, and fails to apply basic sciences knowledge in clinical context during later years of training

The results of present study are comparable to the similar exercise conducted in British medical schools.¹⁷ Surgical colleges had already expressed their grave concern at the decline of undergraduate anatomical knowledge.^{15-17,19} In prevailing scenario it is the responsibility of the medical educationists in general and anatomists in specific to find out the root cause of this deterioration in anatomical knowledge and propose remedial measures for this invasive and erosive problem. We propose a randomized cross-sectional study using problem solving test items to augment the findings of this snapshot of anatomical knowledge prevalent among Pakistani medical students and residents. As the learning strategies employed to learn anatomy

correlate positively with the quality of learning, retrieval and retention of anatomical knowledge; therefore an integrated undergraduate medical curriculum, where anatomical knowledge is structured in a clinical context and fosters critical thinking and problem solving, may be a remedy to our problem.

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