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Technology in Vogue- Revisiting Anatomy and Physiology

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ABSTRACT

Anatomy and Physiology constitute the language to learn and understand Medicine. Basic sciences have been expanding their territory towards Human Genetics, Neuroanatomy, Embryology, Neurophysiology, Sports Physiology, Aviation Physiology, Scuba Physiology and Sleep Physiology. Research in basic sciences is at a pace that out of 224 Nobel Prizes awarded till 2021, Nobel Prize in Physiology and Medicine has been awarded 112 times. Technology has revolutionized teaching and learning methods even during the pandemic. Promising careers in basic sciences is essential to successfully implement the new Competency Based Medical Education. An opinion poll has been conducted among the medical faculty from all specialities whether MD Anatomy and MD Physiology may be made eligible for DM courses? 133 responses have been registered where 72.9% of faculty replied positively. MBBS graduates who opt for postgraduation in Anatomy and Physiology may be made eligible for pursuing superspecialities. Furthermore, new courses like DM Clinical Embryology, DM Neurophysiology or DM Sports Physiology can be introduced in the medical curriculum. This will enhance the enthusiasm of more undergraduates to join preclinicals in their postgraduation thereby filling the large number of seats that are left vacant every year. Anatomists and Physiologists have pioneered in Medical Education. Partaking Anatomist in Surgical team and Physiologist in Medical team strengthens the standards of Health care. Hence it can be understood that Anatomy and Physiology should be revisited in the medical education. "Success is all about consistency around the fundamentals".

KEYWORDS: Anatomy, Physiology, Technology, Superspecialities, Medical Education, Opinion Poll.

INTRODUCTION

As we know, all organs of the human body are connected by the specialized liquid connective tissue, Blood. Similarly the entire Medicine is connected by the language of Anatomy and Physiology. The new Competency Based Medical Education has given 82 topics for understanding Anatomy in the undergraduate curriculum [(1)] and this is the highest number when compared to any other subject. This reflects the priority attributed to the basic sciences in pursuing Medicine.

History :

The history of Anatomy dates long back to ancient period at about 3000 BC where the Egyptians were specialized in preserving the cadavers and their organs separately in different canopic jars [(2)]. "Anubis" was called the God of death in those days [(3)]. Later, Anatomy was studied by the jaw dropping drawings of versatile personality Leonardo Da Vinci. Andreas Vesalius, the father of modern Anatomy performed many live dissections. Leonardo Da Vinci played a significant role in the history of Physiology by creating a Vitruvian man [(4)] in a square and a circle reflecting the proportions of a perfect human body. Claude Bernard, the father of modern Physiology explained about various functional aspects of human body [(5)].

Advances in Anatomy & Physiology :

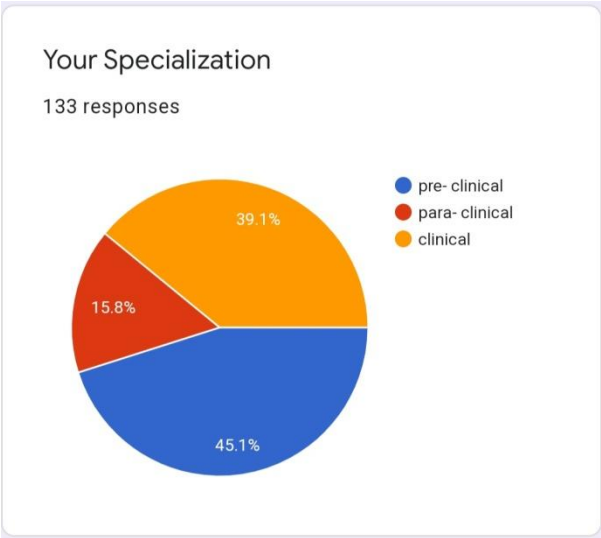
"Every experience in life changes Brain's Anatomy". By the same token, the Human Anatomy has evolved across ages, starting from the earliest observations of sacrificial victims till the modern trailblazing techniques like Plastination or Simulation. Technology has led to the advances in Physiology which include Sleep Physiology, Neuro Physiology (nerve conduction studies), Aviation Physiology, Scuba Physiology and Sports Physiology. Covid Pandemic has transformed the entire teaching learning methodology from offline to online mode. This has led to the evolution of various methodologies like 3D printing, Virtual Reality and Anatomage to name a few. The authors report the transformation of Anatomy and Physiology in Medical Education across the ages and recent advancements and suggestions to revitalize and nurture the fundamental basic sciences through this study.

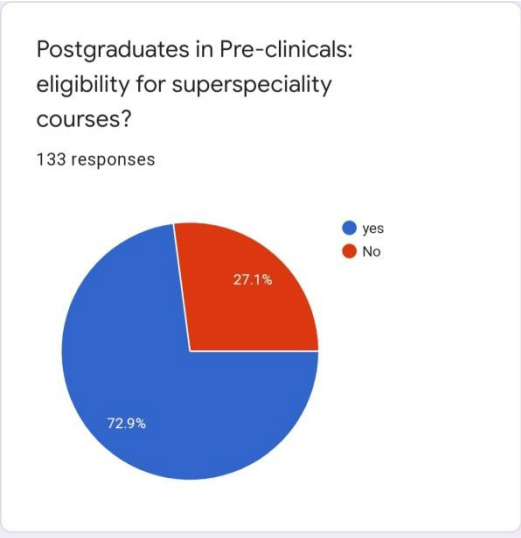
MATERIALS & METHODS

Information was gathered about the history of Anatomy and Physiology. The recent trends were also explained. An opinion poll from the faculty of pre, para and clinical departments was collected by google form with two questions. 133 faculty have responded.

RESULTS

The following pictures represent the graphical responses from 133 faculty across all the departments. Question has been reflected as heading.





When the opinion poll has been evaluated, 72.9% faculty gave their support for making MD Anatomy and Physiology as feeder courses to pursue superspecialities.

DISCUSSION

There has been a tremendous transformation in the outlook of Anatomy and Physiology in the recent modern era to keep pace with its contemporary counterparts in Medicine. This revolutionized the basic sciences in terms of: Academic approach, Teaching methodologies, Blended learning, Variant Anatomy and Research.

The Academic approach has focussed on 3 dimensional images, videos defining every minute detail. Virtual Reality Technique helps to give a crystal clear picture to understand Physiology. Hands on training in the skill labs is another methodology to master some areas of Physiology like ECG, Basic life support etc. Anatomage [(6)] can be thought of as a trendsetter for simulation where human structure could be learnt thouroughly 'n' number of times using do & undo technique without the fear of injuring vital structures as done in traditional dissection. Advanced Anatomage models include functional anatomy where Physiology can also be learnt simultaneously. It has set the precedence of learning the innovative technology with enormous tools imparting the feel of life size digital dissection with highest level of accuracy. Exposure to formalin is minimized. Plastination [(7)] is another jewel in the evolving trends of Anatomy. Certain areas like Neuroanatomy can be mastered using plastinated specimens. Technological skills helped to enhance the creativity in designing animations making imaginative Embryology into reality. Softwares like Virtual Anatomy, Ecland's Anatomy etc. are available at our fingertips. These Novel technologies constitute additional learning tools to our traditional Dissection Halls which say - "The place where the dead teach the living".They can be utilised to achieve the expertise of the competencies but can never replace the traditional cadaveric dissection as opined by faculty and students.

Teaching methodologies :

Eversince the designing of proposals of the new CBME, 1st MBBS students as well as the faculty who teach them became the front line warriors to face, accept, adjust, implement and accomplish the roles, goals and competencies formulated. Medical Education technologies and training have paved the way to invent new teaching methods and methodologies [(8)] like Self Directed Learning, Early Clinical Exposure, Integrated Teaching, Flipped Class, Seminars and many more, for a holistic approach to make learning Anatomy and Physiology more interesting. Blended learning: As a blessing in disguise, the present COVID pandemic has turned the offline constraints to online obligatory teaching mode which was adapted rapidly to fulfil the teaching method during lockdown. It has now emerged out to be an efficient and effective Blended learning [(9)]. Faculty

are redesigning to the "smart work" in teaching Anatomy and Physiology. Developing various learning management systems paved the path for multimedia teaching. Online conferences or CMEs constituted the platforms to enrich the academic growth in basic sciences.

Variant Anatomy:

The modern Anatomy has advanced further on the grounds of Variant Anatomy and Research. Recent studies reveal the escalating frequencies of variant anatomical features like Occipital Spur [(10)] or persistent Axis artery or the lymphatics of brain [(12)] or reptile-like muscles in fetuses to name a few. Research: As quoted by Albert Einstein "Imagination is the highest form of research", knowledge of basic sciences play the role of a Primary Organiser like Notochord connecting the diverse facts from its allied specialities. The scope of research needs to be exponentially widened. The Nobel Prize [(11)] which is the highest landmark in research, has been announced 224 times till now, of which the prize was awarded 112 times to the work done in Physiology.

Embryology is one of the potential areas of Anatomy that needs to be spotlighted. To attain a comprehensive clinical perfection, Embrolyogy has to be addressed in a new dimension. An innovative Superspeciality course like DM Clinical Embryology may be introduced as a feeder course for MD Anatomy. This will enhance the enthusiasm of more MBBS graduates to opt for postgraduation in MD Anatomy, by which the research can be carried to a next level.

An opinion poll from 133 faculty across pre para and clinical departments have been conducted by google forms where 72.9% expressed their encouragement to make MD Anatomy and Physiology as feeder courses to pursue superspecialities. Now is the high time to think of giving scope to revitalize Anatomy and Physiology. There has been a rise of enthusiastic Anatomists and Physiologists across the country pioneering the Medical education and holding diverse roles to consummate the ideas of CBME.

Imparting Anatomist's role in Surgical specialities team and Physiologist's role in Medical specialities team would even strengthen the standards of Medical education in our country. Expanding the horizons of Anatomy and Physiology in this era of technology would complete the meaning of Competency Based Medical Education. "Success is all about consistency around fundamentals".

CONCLUSION

Anatomy and Physiology are the fundamental subjects that nurture the memories of any medical graduate or a post graduate. Technology has led to the evolution paving path for future development. Post graduation in preclinicals may be made as feeder course for certain existing or new superspecialities like DM Clinical Embryology or Clinical Genetics or Sleep Medicine or Sports Medicine may be introduced. With this, more MBBS graduates will opt for MD Anatomy or Physiology, thereby resolving the staff deficiencies in medical colleges and the vision of new Competency Based Medical Education will be accomplished.

CONFLICT OF INTEREST: Nil.

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