Anatomy in the new era: perception of a cross section of anatomists

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Abstract

Background and aims: Anatomy is one of the founding pillars of Medical Science. However, it has a poor preference as a career choice among the medical graduates. This can be attributed to the traditional concept in the minds of the people that it is a subject concerned mainly with cadaver dissection and teaching. This study is therefore aimed at understanding the general perception of anatomists about their subject and analyzing their suggestions for bringing about a positive change in attitude towards the subject. Materials and methods: A cross sectional study was conducted through a questionnaire that was completed by Anatomy faculty and postgraduate students from different parts of India. The study tried to understand the perspective of anatomists towards their subject and give some suggestions to bring about a change. Results: It was seen that Anatomy was the favorite basic science subject among most anatomists. Yet, most of them did not readily take it up as a career option. Participants also came up with various suggestions like the need to introduce superspeciality courses, more clinical application, systematization of research, promotion of fundings and the need to make Anatomy a part of Government’s health education programmes. Conclusion: Anatomists across the country are wishing to have a more active role in the fast changing world. For this, anatomists need to come out of the traditional ways.

Keywords: Anatomy, Career, Research, Superspeciality, Awareness.

Introduction

Anatomy stands at the beginning of medical studies, imparting the basic knowledge of the form and function of the human body, against which pathologic deviations and clinical aspects are taught in later part of the course. Anatomy is essential for medical and paramedical professionals who perform an invasive procedure on a patient, carry out emergency procedures, examine radiological images, perform physical examination of patients or explain a procedure to a patient.

However, in spite of the constant efforts put in by the anatomists, Anatomy has not gained the deserved recognition. This is reflected in the poor preference for Anatomy as a career option during MD/MS counsellings. A study in Nigeria reported only 1.5% of preclinical medical students desirous of a career in anatomy. In another study in India, 30% indicated interest in anatomy as a career only if better options for research and job were made available. This is probably due to the common perception that anatomy is a subject related mostly to cadaver dissection and teaching. However circumstances are changing dramatically as forces both inside and outside the medical profession are shaping the future of all branches of medical science. Anatomists therefore may have to take up new roles and responsibilities in this new era.
This study therefore aims to increase the career interest in Anatomy by:

- Understanding the general perception of anatomists towards their subject
- Seeking suggestions to increase awareness towards Anatomy and to popularize the subject.

Materials and methods:

The study was based on a questionnaire that was circulated among the Anatomy faculty and MD/MS Anatomy postgraduate students of different parts of India. The questionnaire (Annexure - 1) was distributed personally or via post or E-mail. The participation was voluntary and informed consent was taken. No interference was done when filling up the questionnaire. Anonymity was maintained.

A total of 80 anatomists participated in the study. This included 8 Professors, 6 Associate Professors, and 20 Assistant Professors, 16 Demonstrators / SR/Tutors and 30 MD/MS postgraduates.

The participants were asked five questions (as given in the proforma) with a few options. Participants were asked to mark the most appropriate answer. The results were reviewed manually and represented using tables and bar diagrams. Participants were also asked to suggest their personal views to improve the popularity of anatomy among the public and the medical fraternity. The suggestions were manually analyzed for emerging themes. The study team subsequently selected good themes which it felt could bring about some revolutionary change. The themes were then organized into six categories.

Results:

Of the 100 questionnaires distributed, 80 questionnaires were filled up and returned (Response rate was 80%).

For most Anatomists (51.25%), Anatomy had been their favorite basic science subject during their undergraduate days (Table 1). However, only 28.75% of the Anatomists took up the career in Anatomy by choice (Table 2). Most of the Anatomy faculties (72%) in this study are not engaged in research or clinical practice (Table 3). As postgraduates are compulsorily involved in some research in form of dissertation and generally not allowed clinical practice, they were excluded from this parameter. Inadequate fund and/or facility was attributed as the most common cause (67.5%) of low research (Table 4). 87.7% of the participants were in favour of introduction of DM courses for Anatomy doctors (Table 5).

Six categories of suggestions included:

a) Introduction of DM courses after MD/MS Anatomy
b) Clinical skill development among anatomists
c) Systematize areas of research and promotion of funding
d) Vertical and Horizontal Integration
e) Making Anatomy a part of Health Education programmes and school curriculum
f) Better incentives

Discussion:

It was noted that Anatomy had been the favorite basic science subject for 75% Professors, 66.7% Associate Professors, 55% Assistant Professors, 56.2% Demonstrators/SR/Tutor and 40% post graduates in Anatomy (Table 1). As the participants were only anatomists, the results may not be applied to all Medical professionals; yet, it shows a declining appeal for Anatomy over the years.

Although 51.25% liked Anatomy during the initial years of MBBS (Table 1), only 28.75 % choose to be an anatomist by choice (Table 2). In a similar survey of medical students, only 12% strongly agreed, 18% tended to agree while 38% did not agree to take up anatomy as a career option 6. Though the usefulness of the subject is appreciated by the medical students, very few want to pursue it further6.
A teacher in anatomy cannot be replaced by modern teaching techniques. Yet there is an acute shortage of anatomy teachers in medical colleges at a global level and the number of medically qualified preclinical teachers is continuously decreasing. In a survey by the American Association of Anatomists, 83% of the heads of departments had great or moderate difficulty in recruitment of qualified anatomists.

A need has come up to understand the factors responsible for the low preference of Anatomy as a career. One of the major criteria in selection of a subject as a career is the financial status accorded to it. Inadequate financial returns are associated with professions involving pre and para-clinical subjects. A clinician without a job in a medical college can join a hospital or a nursing home or set up his own chamber. A para-clinician without a job can join a laboratory. But opportunities for a pre-clinical doctor are limited.

An unemployed qualified anatomist can go for clinical practice as stressed by one participant: "An MD/MS Anatomy is also a doctor. So they can treat patients as other specialists." However, it is seen that the confidence to treat any ailment goes down with the years and this is aggravated by lack of knowledge of advanced clinical methods and increased public awareness and also due to continued alienation from patients over the years.

Onakpoya et al noted that the top five factors that influence a career choice in anatomy are career progression, on-call commitment, a teacher as a role model, love for anatomy and interest in the subject. Such interests are usually aroused during training. Other factors noted were personal interest, life style habits, income and gender.

Another factor that determines the choice of career is the opportunities for future by which they can bring a positive change to society. This may be in the form of higher studies or research. But, in India there are inadequate research opportunities for anatomists.

In a bid to find solutions, suggestions were also asked from the participants (Table 6 and 7). Many suggestions were received. Organizing conferences, seminars, CMEs and workshops was the most common type of suggestions. But the study team selected only those suggestions which it felt could cause a strong impact in the future.

1. Introduction of DM courses after MD/MS Anatomy:

One participant felt that "Anatomists should be eligible for DM which is presently unavailable in India." Another anatomist noted that "most medical specialities have options for superspecialities. But there is no superspeciality in Anatomy". A Medicine specialist has the option to go for Neurology, Cardiology, Nephrology, Pulmonary Medicine, Rheumatology, Gastroenterology, Hepatology, etc. A Surgeon can go for Neurosurgery, Cardiothoracic Surgery, Urology, Hepato-Pancreatico Biliary Surgery, etc. Even a Physiology specialist has an option for DM in Immunology while a MD in Biochemistry has options for DM in Endocrinology, Immunology and Clinical Hematology. But there is hardly any superspeciality degree presently available for an Anatomist in India.

Some areas where superspecialities were suggested for Anatomy doctors are:
- Medical Genetics
- Reproductive Medicine / Clinical Embryology
- Gene therapy
- Stem Cell therapy

There were a few who raised doubts about the need of DM for anatomists. One participant felt that "there is already PhD options available for higher studies. Then why do we need DM?"

However, the support for superspecialities (DM) was overwhelming, both among the faculty (86%) and postgraduates (90%) (Table 5).
2. Clinical skill development among anatomists

Only 10% anatomists in this study continued to use their clinical skills in some form or the other. This indicates that the potential of anatomists has not been fully utilized. Anatomy as a subject has suffered as a result of its failure to evolve and adapt quickly enough.

Many participants stressed on the active cooperation between anatomists and the clinical departments as noted in the suggestions like "Anatomists should be trained in ultrasound", "More vertical integration should be there.", "Anatomists can do minor surgical procedures", "Anatomists should be trained in genetics, in-vitro fertilization and imaging.", "Anatomists can design prosthesis", "New subjects with clinical application should be introduced within anatomy so that this important subject gets its deserved popularity."

Thein et al have described the cooperation between the Departments of Anatomy and Maxillofacial surgery for jaw reconstruction using pelvic bone graft. Herrmann quotes several examples where clinical anatomy has played crucial role in diagnosis and treatment of clinical cases. Putz feels that for the future viability of anatomy, high quality collaboration with clinicians is essential. For that, anatomists must have specialized knowledge of concrete clinical questions.

Genetics is the most potential area of future work as felt by most anatomists. Few participants also stressed on works on Gene therapy. Specialists from different fields including Anatomists have made great contributions in the field of genetics. However anatomists are still not eligible for DM in Medical Genetics in India. Necessary clinical training for this purpose should be given to anatomists. One participant suggested that "Anatomists can be trained more on the genetic diseases. But training should not be restricted to age-old theoretical methods. They should be trained to actively participate in the diagnostic, preventive and curative aspects as well."

Assisted Reproductive Techniques and in-vitro Fertilization was the second most popular area as noted by the participants. Embryology is already a key part of the Anatomy curriculum. In near future, Assisted Reproductive Techniques can be part of the Anatomy post-graduate curriculum.

Imaging was also another popular area for the participants. Traditionally, our knowledge of anatomy had been derived from cadaveric dissections and surgeries. However the contemporary student also requires the orientation to anatomy from various imaging resources. Therefore, in this new era, anatomists should get access to different imaging techniques to study the living body. With the advent of CT scan and MRI, trained anatomists would be required as cross sectional anatomy experts.

Anatomy doctors are already aware of the basic surgical procedures and well versed with anatomy. They can be therefore easily trained in some minor surgical procedures. Anatomists may also be given advanced training on biomechanics which can make them key personnel in designing of prosthesis and medical equipments.

Participants also suggested many other areas of activities which can be started as short term courses. These included Clinical Neuroanatomy, HLA typing, Genetics, Special Histological Techniques, Plastination, Stem Cell therapy, Minor surgeries, Electron microscopy, Immunology and Immunohistochemistry, Ultrasound, and other imaging techniques, Cross-sectional anatomy, Sports Medicine, Teratology, etc.

There were also a few sections of anatomists who did not approve the above changes and felt that anatomist should focus solely on teaching. One of them opined that "Anatomists are only teacher and there is no need for patient interaction" while another felt that "We are teachers and we should concentrate on teaching only"
3. Systematize areas of research and promotion of funding:

Only 18% anatomists in this study were involved in research. Most (67.5%) felt that shortage of fund and facilities is the main factor preventing them from undertaking any modern research. 12.5% were short of ideas which can be attributed to the general preoccupation of anatomists with morphologic anatomy. Anand et al also feel that there are inadequate job and research facilities in India for anatomists.6

Local, National and International bodies must be encouraged to sponsor research in anatomical fields. Institutions must be encouraged to provide the facilities and equipments for research. More conferences and CMEs should be held for exchange of ideas. Research should be need based for India. There should be appreciation and recognition of the research work especially at government level. Anatomy departments can forge educational and financial links with hospital departments and some medical schools.13 This will help the hospital departments to train its doctors with vertical integration programmes with the Anatomy department. The Anatomy department can also benefit by way of funds for carrying on research works and train its staff with more clinical exposure. Research opportunities can also be improved by attaching cytogenetic, hormone assay laboratories with the department of anatomy which will help to increase patient interaction with anatomists.6

4. Vertical and Horizontal Integration:

In a study by Pabst, 90% of students wanted reinforcement of the subject by lectures during clinical studies while 75% of students supported specialized clinical dissection course during their clinical curriculum. In a Nigerian study, 90.3% students agreed on the immense contribution of anatomy during clinical rotations. In a revised integrated teaching schedule of anatomy with other subjects should be prepared to maintain continuity of the subject during clinical rotation in hospitals.6

Increasing stress has been given on Vertical and Horizontal Integration by many authors. This need to be more regularized. In our study too, many participants supported the need of more horizontal and vertical integrations with suggestions like:

- "Anatomy classes should be conducted for clinical postgraduates."
- "Hands on training for anatomy postgraduates in clinical departments."
- "Hands on training in Anatomy departments for doctors of various surgical fields."
- "Anatomists can attend Operations."
- "Conduct refresher classes or CMEs from time to time for interns, clinical postgraduates and faculties of other departments."

5. Making Anatomy a part of Health Education programmes and school curriculum

Various suggestions were received to increase the popularity of Anatomy among common public (Table 7) like organizing awareness programmes for body donation, opening up of Anatomy museums to public, use of mass media to spread the knowledge of anatomy, etc. Inclusion of more human anatomy in school curriculum can also go a long way to increase public awareness towards anatomy. Governmental health awareness programmes can include some concepts of anatomy which can help the common people understand their own bodies and the causes of many health problems. The public's fascination with human anatomy has been recently exposed with the 'Body World' exhibitions of Prof. Von Hagens and television programmes such as 'Anatomy for Beginners'.

6. Better incentives:

Two participants suggested more pay and better incentives and bonuses for preclinical subjects like anatomy as a way to popularize the subject and attract more people. One of them noted that "clinical application and patient interaction not possible. Pay more salary."
A lacuna in this study is that it focused on a cross-section of anatomists only and it may not reflect the opinion of the entire medical fraternity. However only anatomists were selected as they were the best persons to understand the problems and needs of their subject. Another lacuna in this study is that it covered only 80 anatomists which is only a small percentage of the total anatomists in the country. Further study with larger samples may be undertaken in future.

**Conclusion**

This was a cross-sectional study amongst a group of anatomists in India. A preliminary evaluation of their opinion as regards to anatomy was obtained. Our study reflects a hesitation of medical community to choose anatomy as a career option and tries to understand the cause. It tries to feel the pulse of the anatomists toward their subject. It reflects their positive attitude and their hopes for better changes. One participant noted, "Every anatomist can improve the subject in his/her own way. Be the change you want to see."

Anatomists have to adopt new ways to remain at par with other departments. The study gave a hint that anatomists are willing to take up new roles in this fast changing world. Besides teaching, they are ready for higher studies, more research and wider clinical applications. Anatomists and policy makers must therefore unite, plan and work together for a better tomorrow.

**Table 1: Was Anatomy your favorite Basic Science subject during undergraduate days?**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Do not know</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors</td>
<td>6 (75%)</td>
<td>1 (12.5%)</td>
<td>1 (12.5%)</td>
<td>8</td>
</tr>
<tr>
<td>Associate Professors</td>
<td>4 (66.7%)</td>
<td>1 (16.7%)</td>
<td>1 (16.7%)</td>
<td>6</td>
</tr>
<tr>
<td>Assistant Professors</td>
<td>11 (55%)</td>
<td>5 (25%)</td>
<td>4 (20%)</td>
<td>20</td>
</tr>
<tr>
<td>Demonstrators/SR/Tutor</td>
<td>9 (56.2%)</td>
<td>3 (18.75%)</td>
<td>4 (25%)</td>
<td>16</td>
</tr>
<tr>
<td>Postgraduates</td>
<td>12 (40%)</td>
<td>10 (33.5%)</td>
<td>8 (26.7%)</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>41 (51.25%)</strong></td>
<td><strong>21 (26.25%)</strong></td>
<td><strong>18 (22.5%)</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

**Table 2: Why did you choose Anatomy as your subject/career?**

<table>
<thead>
<tr>
<th></th>
<th>Wanted to be an Anatomist</th>
<th>No Particular subject of choice</th>
<th>Wanted another specific subject</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors</td>
<td>3 (37.5%)</td>
<td>3 (37.5%)</td>
<td>2 (25%)</td>
<td>8</td>
</tr>
<tr>
<td>Associate Professors</td>
<td>2 (33.3%)</td>
<td>3 (50%)</td>
<td>1 (16.7%)</td>
<td>6</td>
</tr>
<tr>
<td>Assistant Professors</td>
<td>6 (30%)</td>
<td>6 (30%)</td>
<td>8 (40%)</td>
<td>20</td>
</tr>
<tr>
<td>Demonstrators/SR/Tutor</td>
<td>8 (50%)</td>
<td>5 (31.25 %)</td>
<td>3 (18.75 %)</td>
<td>16</td>
</tr>
<tr>
<td>Postgraduates</td>
<td>4 (13.3%)</td>
<td>22 (73.3%)</td>
<td>4 (13.3%)</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23 (28.75%)</strong></td>
<td><strong>39 (48.75%)</strong></td>
<td><strong>18 (22.5%)</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>
Table 3: How do you spend your spare time?

<table>
<thead>
<tr>
<th></th>
<th>Clinical Practice</th>
<th>Research</th>
<th>None of the above</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>5 (10%)</td>
<td>9 (18%)</td>
<td>36 (72%)</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 4: What is the cause of low research?

<table>
<thead>
<tr>
<th></th>
<th>Inadequate fund and / or facility</th>
<th>Inadequate guidance</th>
<th>Personally not interested</th>
<th>Cannot think of a good topic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>35 (70%)</td>
<td>9 (18%)</td>
<td>3 (6%)</td>
<td>3 (6%)</td>
<td>50</td>
</tr>
<tr>
<td>Postgraduates</td>
<td>19 (63.3%)</td>
<td>3 (10%)</td>
<td>1 (3.3%)</td>
<td>7 (23.3%)</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>54 (67.5%)</td>
<td>12 (15%)</td>
<td>4 (5%)</td>
<td>10 (12.5%)</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 5: Do you support introduction of DM after MD/MS Anatomy?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Do not know</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>43 (86%)</td>
<td>3 (6%)</td>
<td>4 (8%)</td>
<td>50</td>
</tr>
<tr>
<td>Postgraduates</td>
<td>27 (90%)</td>
<td>2 (6.6%)</td>
<td>1 (3.3%)</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>70 (87.5%)</td>
<td>5 (6.25%)</td>
<td>5 (6.25%)</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 6: Summary of suggestions to increase the popularity of Anatomy as a career option within Medical fraternity

1. Conducting more anatomical conferences, seminars, CMEs, workshops, hands on training with multi-disciplinary participation.
2. Development of clinical skills and applications among anatomists.
3. Open short term courses in Genetics, Imaging, Assisted reproduction, Biomechanics, Clinical Neuroanatomy, HLA typing, Special Histological Techniques, Plastination, Stem Cell therapy, Minor surgeries, Electron microscopy, Immunology, Immunohistochemistry, Ultrasound, and other imaging techniques, Cross-sectional anatomy, Sports Medicine, Teratology, etc.
4. Promote research. Include new areas of research in the current post graduate curriculum and special training to the existing anatomy faculty.
5. Promote fundings and sponsorships in anatomical research: both governmental and private.
7. Horizontal integration.
8. Introduction of super-specialty subjects (DM/MCh) after MD/MS Anatomy.
9. Conduct refresher courses in anatomy for interns and clinicians.
10. More interaction between anatomists and clinicians.
11. Use of computer animation, advanced dismantable 3D models, 3D computer simulation and new technology that both students and clinicians can look forward to.
12. Pay more salary and better incentives.
<table>
<thead>
<tr>
<th></th>
<th>Summary of suggestions to increase the popularity of Anatomy among public:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Promote Anatomists-Patient interaction by training anatomists in anatomy related clinical applications like IVF, Genetics, Imaging, etc.</td>
</tr>
<tr>
<td>2</td>
<td>Teach common people how to use the knowledge of anatomy in day to day practice.</td>
</tr>
<tr>
<td>3</td>
<td>Experts can discuss anatomy related topics in television, radio, newspapers and magazines.</td>
</tr>
<tr>
<td>4</td>
<td>Conducting awareness programmes for body donation.</td>
</tr>
<tr>
<td>5</td>
<td>Basics of anatomy should form part of Health education programmes.</td>
</tr>
<tr>
<td>6</td>
<td>Basics of anatomy should form part of high school level curriculum.</td>
</tr>
<tr>
<td>7</td>
<td>Opening up Anatomy museums to public.</td>
</tr>
<tr>
<td>8</td>
<td>Camps and seminars at community levels.</td>
</tr>
<tr>
<td>9</td>
<td>Conducting anatomy exhibition, anatomy photo exhibitions, etc among public.</td>
</tr>
<tr>
<td>10</td>
<td>Develop interesting animation and softwares in anatomy for public viewing.</td>
</tr>
<tr>
<td>11</td>
<td>Relate to real patients along with cadaver dissection.</td>
</tr>
<tr>
<td>12</td>
<td>Not needed. Anatomists are teachers should concentrate on teaching only.</td>
</tr>
<tr>
<td>13</td>
<td>Patient counseling, genetic counselling.</td>
</tr>
</tbody>
</table>

**ANNEXURE -1**

**PROFORMA**

A) Please choose the most appropriate answer

1. Was Anatomy your favorite Basic Science subject during your undergraduate days?
   a. Yes
   b. Do not know
   c. No

2. Why did you choose Anatomy as your career?
   a. Wanted to be an Anatomist in particular
   b. No particular subject of choice.
   c. Wanted another specific subject.

3. How do you spend your spare time?
   a. Clinical Practice
   b. Research
   c. None of the above

4. What is the cause of low research (if so)?
   a. Inadequate fund and/or facility
   b. Lack of guidance
   c. Personally, not interested
   d. Cannot think of a good topic

5. Do you support introduction of DM after MD/MS Anatomy?
   a. Yes
   b. Do not know
   c. No

B) Suggestions to improve the popularity of Anatomy among Medical Fraternity

C) Suggestions to improve the popularity of Anatomy among Public.
References:


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