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# Embryology in the Nigerian Medical Curricula: Present Realities, Future Challenges

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## ABSTRACTS

An urgent need to bring medical education and curriculum planning issues to the fore in Nigeria has been expressed severally given the inadequacies of the current traditional approach to medical education in Nigeria. This study examined the status of Human embryology in the curricula of Nigerian medical schools, highlighting issues with immediate and long term implications. A descriptive cross-sectional self administered questionnaire was distributed among Heads of Anatomy Departments and Embryology faculties who attended the 4th Annual Conference of the Anatomical society of Nigeria at Delta State University, Abraka, Delta State. The returned questionnaires were then analyzed. Our findings were that the pedagogical approach still persists in the teaching of embryology, with the course anchored essentially by Junior Cadre faculty. Readily available cost effect audiovisual aids were not optimized in teaching the course. Sampled schools were not conducting any form of curriculum review involving embryology as at the time of the study. It appears anatomy teachers in our medical schools are yet to recognize the enormous changes that have taken place globally over the last decade in the way human embryology is taught.

**Key words:** Embryology, Medical Curricula, Nigerian Univrsities

Dramatic changes have occurred in medical education globally, driven by rapid expansion in medical knowledge, the development of new advanced technologies and a perceived need for a different educational approach to the training of medical doctors (Gukas 2007, Didia 2004, Heylings 2002). Modifications of the undergraduate medical curriculum have had great impact on the way the anatomical sciences are taught in several foreign medical schools, raising concern among anatomists (Patel and Moxham 2006). Although several studies have been undertaken to examine the impact and "burden" which recent curricular review have had on human anatomy as a discipline, most of such studies were restricted to gross anatomy to the near exclusion of the other subspecialties of human anatomy. These studies have shown that the time allotted to the teaching of gross anatomy has declined substantially in several countries where paradigm shifts in medical education have been undertaken (Verhoeven et al 2002). Interestingly, the significance of gross anatomy in the medical curriculum has been debated with some arguing that it has an exaggerated place in the initial training of medical doctors (Moxham and Plaisent 2007).

Carlson (2002) has observed that embryology, more than most disciplines of basic medicine, has had considerable difficulty finding a comfortable niche in the medical curriculum. Recent advances in molecular embryology have created a dilemma of some sort for anatomy educators as to how much of the new information to incorporate into the old developmental anatomy viz-a-viz curriculum overload. The role which embryology should play in the 21st century medical programme is still uncertain. The global paradigm shift in medical education has raised issues of concern for African medical schools. Gukas (2007) noted that in today's globalized world, with medicine viewed as an international commodity, the attainment of global standards for medical training is a minimum expectation from training institutions irrespective of geographic location. The National Universities Commission (1989) and the Medical and Dental Council of Nigeria (2006), as a response to global trend, have proposed momentous changes to the design and content of the

undergraduate medical undergraduate medical programme in Nigeria. In view of the emerging scenario, there is a need to actively engage our medical schools to reappraise their current approach to medical training. For Anatomy Departments, this is critical as the proposed changes will have profound impact on the way the different sub disciplines of anatomy are currently taught in Nigerian medical schools.

In this study, our objective was to find out the present status of embryology in the Nigerian medical curricula; the way the subject is taught. Our hypothesis is that there are issues which are critical to the effective participation of embryology in the unfolding curriculum of tomorrow's medical education in Nigeria.

## MATERIALS AND METHODS

The study was conducted during the 4th Annual Scientific Conference of the Anatomical Society of Nigeria between the 13th - 16th of September, 2006 which held at the Department of Human Anatomy, Delta State University, Abraka. A six page questionnaire, prepared according to the format used by Collins et al (1994) in a similar study on the status of Gross Anatomy in the United States and Canada, was administered to Heads of Anatomy Departments of Nigeria Medical Schools who were present at the conference. Only medical schools that had mounted embryology courses for at least five consecutive sessions prior to the date of the study were recruited. In the instance that a Head of Department of a recruitable school was unavailable at the conference, the questionnaire was administered to the embryology course Coordinator or Unit Director of that institution in the 2005/06 session or the most senior anatomy faculty who was available from the school.

Information from the returned questionnaires were entered into Microsoft excel® for windows XP 2003® and tabulation of data performed. The obtained results were expressed either as number of schools responding or percentage of responses per question or combination of questions out of the total number of respondents. Numbers were reported to the nearest integer unless stated otherwise.

## RESULTS

**Respondents:** The questionnaires were completed and returned by fifteen respondent medical schools, fourteen of which were accredited by the Medical and Dental Council of Nigeria (MDCN); representing 74% of accredited medical schools in Nigeria as at September 2006. One respondent school was yet to be accredited as at the time of the study but had mounted embryology course for five consecutive sessions. Forty seven percent of the respondents were of the rank of senior lecturer and above. Forty percent (6) were of the rank of lecturer I and II. Thirteen percent of respondents (2) were Assistant Lecturers. Sixty seven percent of respondents (9) were Heads or acting Heads of Department; 33% (5) were embryology course directors/coordinators as at the time of the study.

**Embryology Course:** The course was taught in the 2nd and 3rd year of the basic medical programme in 67% of respondent schools. The average number of course contact hour was approximately 29 hours (R: 22-36 hours) and the average size of embryology class was 293 students (R:57-700), inclusive of medical and non-medical students who offered the course. In 80% of respondent medical schools, embryology was taught as a separate course. University of Lagos and University of Sokoto incorporated the course into the gross anatomy course, with introductory embryology topics presented as a separate teaching block within the gross anatomy course. There had been no change in the number of contact hours allotted to embryology in all respondent schools in the five years preceding the study.

**Course Content:** Table 1 shows the extent of incorporation of various topics in the embryology curriculum. General embryology topics and organogenesis were extensively incorporated by most schools (93%).

**Instructional Method**: The traditional didactic lecture method was the most regularly employed instructional method for delivering the course to students among respondent schools. Tutorials were regularly provided in seven (46.6%) of sampled schools whereas only five (33.3%) respondent schools said they organized conferences as a means of embryology instruction to their students. The most regularly employed teaching aid among respondent schools was the use of writing board and markers (73.3%). In only four schools (26.7%) was multimedia presentation regularly employed for teaching embryology. Some schools (53%) provided "laboratory" experience to their students, which consisted essentially of museum specimens' (27.7%), models (47%), pre-recorded television presentations (13%) and internet based or commercially available digital animations (7%). Students' attendance to embryology classes and "laboratory session", where mounted, was required in all schools but no prescribed penalty was regularly administered for absenteeism nor reward for attendance. In all respondent Schools, an embryology textbook was required or recommended. Most schools allowed students to choose between two or three texts. The most recommended texts were those authored by Moore and Persaud (60%); Sadler (33%) and Singh (6%).

**Academic Staff:** The number of academic staff who had taught embryology in all respondent schools in the five years prior to the study was 76; this gave an average of 5 faculty per school. Most (94.7%) were tenured staff. The academic ranking of embryology faculty is presented in table 2. In two old medical schools, the highest rank of tenured faculty who taught embryology during the 2005/06 session was Lecturer I. Table 3 shows the proportion of faculty who were involved in embryology-related research as at the time of the study. Tenured academic staff who have attended a conference on developmental anatomy in the five years preceding the study was 20 representing only 26.3% of faculty who taught embryology. In none of respondent medical schools was the teaching of embryology by faculty formally evaluated. Also, none of the respondent schools, as at the 2005/06 session was conducting a "pilot" study to examine the role of embryology in their school's medical curriculum.

**Perspective:** Most respondents (86.7%) believed that their undergraduate students were being given adequate exposure to embryological sciences in their medical curriculum as constituted. A similar proportion of respondents believed that the number of anatomists being trained to meet the teaching needs of embryology in Nigeria for another decade was inadequate. As to the question of whether graduate programs in Nigeria were giving future anatomists adequate exposure to modern concepts and techniques in embryological sciences, most respondents (93%) were of the opinion that the programs were not providing the needed exposure.

**Table 1: Extent to which Embryology Topics were incorporated into the Medical curriculum**

| Topic | Extent of Incorporation (%) | | |
|---|---|---|---|
| | Very much | Some what | Very little |
| Cell cycle | 67 | 33 | - |
| General embryology | 93 | 7 | - |
| Fetal physiology | 53 | 40 | 7 |
| Organogenesis | 87 | 13 | - |
| Teratology | 53 | 47 | - |
| Medical Genetics | 53 | 33 | 13 |
| Molecular regulation of Development | 20 | 60 | 20 |
| Embryotechnology | 7 | 3 | 60 |

*Footnote: Figures represent number of respondent schools in percentage. Topics in general embryology include gametogenesis, fertilization to gastrulation, embryonic folding and timing of embryonic events.*

## DISCUSSION

Embryology is an important component of the medical curriculum. It is considered as a powerful adjunct to an indepth understanding of gross anatomical patterns, providing the student with the scientific basis for understanding the

**Table 2: Academic Ranking of Anatomy Faculty who taught Embryology in Sampled Schools**

| | | |
|---|---|---|
| Professor | - | 5 |
| Reader | - | 1 |
| Senior Lecturer | - | 10 |
| Lecturer I | - | 18 |
| Lecturer II | - | 20 |
| Assistant Lecturer | - | 14 |
| Others | - | 8 |

**Table 3: Proportion of Anatomy Faculty who were conducting embryology-related research as at the time of the study**

| No. of staff | No. of Respondents |
|---|---|
| 0 | 4 |
| 1 | 6 |
| 2 | 3 |
| 3 | 2 |

mechanisms underlying normal and abnormal development. Prior to this time, embryology was taught in the conventional, didactic, teacher-oriented method; most often as a separate course with minimal integration with the other biomedical science courses. Incidentally, this traditional method of teaching embryology, which still obtains in our medical schools, has been replaced by newer educational models of instruction in several foreign medical schools. It is noteworthy that a core system-based, student-centred and self-paced approach has been put in place by most medical schools in Europe and North America (Carlson, 2002) and of course in many developing world countries (Gukas 2007). The other novel instructional method adopted by even medical schools in India, South Africa and Sudan (Nayak et al 2006, Gukas 2007) is the problem-based learning model. In the problem based learning model, embryology or any other subject for that matter is presented to the student in the context of the clinical problems which may be encountered, It is significant to note that in those countries where newer educational methods have been adopted, the average time allotted to teaching embryology has reduced considerably. Whereas in Nigerian medical schools the embryology contact hour has remained at an average of 29 hours for the five years preceding this study, being similar to 28 hours in Saudi Arabia (Khan 2007), it has been reduced to 16 hours in the United States as a result of extensive revision of the medical curriculum (Drakes et al 2002).

One important finding of this study is the under utilization of readily available educational technologies which aid teaching among sampled schools. This has implications as to the effective learning of embryological concepts by undergraduate students. Clyde (2005) has noted that the use of educational technologies such as computers, the internet and virtual learning environment facilitates the process of learning. Indeed, educational technologies are very significant to embryology learning as the subject often requires the presentation of complex dynamic processes in which three-dimensional structures change overtime. As a first step, Anatomy departments in Nigeria should consider adopting a policy whereby all lectures are delivered by aid of multimedia, as this is affordable and encourages computer literacy among faculty and students. Web-based learning, which is now- the standard in many schools in the United States, may be considered in the future, although it has economic implications. The advantage of web-based learning, as highlighted by Carlson (2002), is that outlines of entire courses, illustrations, animations of embryological processes such as fertilization, embryonic folding, rotation of gut, among others can be provided at secure internet sites to the benefit of students. This allows for self-paced learning, optimizes allotted time and improves students understanding of the subject matter.

A critical review of the embryology course content of sampled schools revealed the placement of emphasis on general embryology topics to the near exclusion of such frontline topics as the molecular control of development, embryo technologies and stem cell research.

This prioritization is understandable considering our traditional approach to medical education, the focus of our medical curricula on primary health care and, of course, issues of time constraint in the curriculum. Most schools in Europe and America, in recognition of the relevance these special topics have assumed in 21st century medical science, have adopted conferences in the basic medical programme as a means to giving students the needed exposure to the most basic rudiments of these concepts; since they are insufficiently covered in the curriculum. These conferences often involve the participation of both basic and clinical science faculty thereby also enabling students to bridge the gap between basic science instructions and clinical applications. At the moment, conferences of this kind are unpopular among our medical schools, as shown by our study. Nevertheless, they are strongly recommended here considering their obvious advantages.

Need assessment is a necessary first step to curriculum revision. As at the time of conducting this study, none of the evaluated medical schools had undertaken or were undertaking or planning to undertake a programme to examine the role of embryology in their curriculum. This is despite the consensus for a change in the content and design of the Nigerian undergraduate medical curriculum (NUC 1989, MDCN 2006). Also, it appears, as indicated by our findings, that the teaching of embryology has been left to junior cadre anatomy faculty. The few available senior faculty, who have not been lost to the brain drain phenomenon, are presently increasingly engaged with administrative responsibilities and rarely participate in teaching. Nkanginieme and Eke (2001) have noted that medical teachers in Nigerian Universities are often young and untrained in educational methods; an observation which has been recently re-echoed by Ibrahim (2007). According to these authors, it brings to question the quality of teaching delivered in our universities and the need for training and retraining of faculty members especially in educational methods. Unfortunately, formal audit of faculty teaching, which would have provided the impetus for change, is not undertaken in our medical schools, atleast, as it relates to the teaching of embryology.

Most respondents in this study expressed contentment with their multicolumn and did not see the need for a review. This indicates either a lack of awareness in current trends in medical education or a reluctance to embrace change. Furthermore, most respondents recognized the need for more trained anatomists with the general perception being that post graduate level training in anatomy in Nigeria does not provide the necessary exposure to current trends and techniques in embryological scie1)ces. Therefore, improving the quality of embryology course in the medical cUlTicula of our schools will require, in addition, a reappraisal of the content of embryological sciences in the postgraduate anatomy programs of Nigerian universities.

## CONCLUSION

The world has moved on as it relates to innovations in medical education. This reappraisal which focused on embryology education as a case study has not only indicated our adherence to an old-fashioned curriculum but it has also shown the slowness of anatomy departments in Nigeria to recognize the enormous change that have taken place in the way embryology is taught and learned over the past years. The study has further reinforced the need for external help and intervention from such bodies as the World Federation of Medical Education, Association of Medical Education Africa, among others in issues relating to curriculum planning in our medical schools.

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