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CLINICAL OBSERVERSHIP AS AN AID TO LEARNING AND UNDERSTANDING OF HUMAN EMBRYOLOGY

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ABSTRACT

Hands-on learning approach such as 'Clinical observership' is globally applicable in learning. This study evaluated clinical observership as an aid to pre-clinical medical students' understanding of human embryology. Students were grouped into A and B; group B took calls as student-observers in the labour ward of Ekiti State University Teaching Hospital in addition to taking regular classes in embryology while group A was the control group. Previously validated self-administered questionnaires were used to test students' intelligence quotient and knowledge of embryology before and after lectures and clinical observership. The short-term effect of clinical observership was tested by comparing the pre-field and post-field responses of the student-volunteers while the long-term effect was tested by evaluating their performance in the first professional exams after the completion of pre-clinical program. The perception of group B participants on the observership program was assessed with a pre-tested questionnaire. There was no significant difference (p=0.4162) in the IQ between the control (77±1.2) and the experimental group (79±1.4). There was no significant difference (p= 0.0795) in the mean pre-observation test score between the control (33±1.7) and the experimental group (38±1.7). However, a significant increase (p=0.0282) was observed in the mean post-observation test score in the experimental (29±2.4) when compared with the control (22±1.9). Although there was an increase in the mean score in the MBBS exam in the experimental group (59±2.7) when compared with the control (57±2.0), it was not statistically significant. On the perception of the method in improving learning, majority of the students were affirmative. Clinical observership enhances the learning of embryology hence we recommend its incorporation into the teaching methods of embryology in medical schools.

Keywords: Clinical involvement, Medicine, Learning aid
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INTRODUCTION

Human embryology as an important research area encompasses topics of major interest such as artificial reproduction, embryo manipulation, tissue engineering and stem cell (Ginani et al, 2012). It remains an integral part of the preclinical teaching in medical curricula and an area that is mostly overlooked by medical students despite its applications in different fields of medicine. Its teaching remains important in the medical curriculum as it helps students to understand the development of the body organs of the adult, emergence of anatomical variations in number and final position or topographic specificity of adult structures, organization of human body and how congenital abnormalities may form (Scott et al., 2013; Kachlik et al., 2016). According to Moraes and Pereira (2012), the study of embryonic and fetal processes is fundamental to providing medical students with a consistent scientific basis which helps them understand the mechanisms of normal, variant and abnormal human development.

Embryology teaching methods vary greatly between countries and universities (Moxham, 2017). According to Drake et al. (2002), embryology is usually taught together with gross anatomy (integrated courses) in the United State of America. Varga (2017) reported that in most medical schools in the Czech Republic, it is taught in conjunction with histology. Alternatively, in Nigeria, it is a completely separate stand-alone course (NUC, 2017). It has been shown that teaching embryology only in the lower years of medical studies results in poor students understanding and underestimation of its clinical importance. It is therefore suggested that clinically oriented embryology should be added to the curriculum in later years of the medical program (Scott et al., 2013; Hamilton and Carachi, 2014).

Embryology is often difficult to teach due to the need for demonstration of the rapid, three-dimensional changes that occur concurrently on both macroscopic and microscopic scales. Embryologists who are involved in education have constantly been seeking for the best approach to transmitting the visual information on human development to students (Carmichael and Pawlina, 2000). Some of the approaches being used to teach human embryology are the use of wax model embryo, clinical case studies of malformations, projection of images, films and rarely, dissection of human embryo and fetus (Puerta-Fonollá et al., 2004; Yamada et al., 2006; Shankar and Roopa, 2009). Some embryology educators suggested peer teaching, improved animations, greater focus on clinical application and later teaching of embryology in clinical parts of the course as more effective (Shankar and Roopa, 2009; Scoville et al., 2010; Yu et al., 2011; Cassidy, 2015). Of the different curricular models that exist for embryology teaching, most medical schools within and outside Nigeria present embryology as a lecture-based course with no laboratory exposure. Previous research has shown a link between learning styles and academic performance of medical students (Lujan and DiCarlo, 2006). Multimodal learning is a preference style which is more effective as it focuses more on practicals in addition to traditional lecture time (Bulent, 2015). How best can embryology information be presented effectively to students? This study therefore aimed at evaluating 'clinical observership' as an aid to medical students' learning and understanding of human embryology.

MATERIALS AND METHODS

Study participants

This study was carried out among the second-year pre-clinical students of the College of Medicine, Ekiti State University in the 2016/2017 session; prior to commencing lectures on Embryology. Embryology is taken at the general and systemic level throughout the pre-clinical program which runs for 18 months. Following convenience cluster sampling, the class of fifty-eight (58) students was addressed on the aims and scopes of the research work and assured that the decision to be exempted or withdrawn from the study at any point would not have an effect on their grading in tests and examinations. Volunteers were asked to write their names with their class representatives and fill the informed consent form within seventy-two (72) hours. All the students volunteered to participate in the study.

Study Instrument

Previously validated questionnaires were used to test students' intelligence quotient (IQ); knowledge of human embryology of the students before (pre-observation) and after (post-observation) a series of lectures and clinical observership; and to evaluate perception of the observership program by

students in the experimental group. The questionnaires used in this study are available as supplementary files upon request. The IQ test was adapted from a suite of standard IQ tests and it contained 60 questions to test participants' verbal comprehension, perceptual reasoning, working memory and processing speed. The questionnaire used to assess knowledge of embryology during the pre-observation and post-observation phases of the study included questions in General Embryology based on the general embryology part of their first-year course in General Biology. Scoring the pre-field and post-field observations, negative marking system was introduced for post-field as students were not expected to freely guess after being taught general embryology. A negative mark of 0.5 was applied for every wrong choice of answer. The short-term effect of clinical observership was tested by comparing the pre-observation and post-observation responses of the student-volunteers while the long-term effect was tested by evaluating their performance in multiple-choice questions (MCQs) in Embryology in the first professional MB (Bachelor of Medicine) exams after the completion of the pre-clinical program which lasted for 18 months. All scores were in percentages. The questionnaire used for evaluation of their perception of the observership program was self-designed and scored with a 3-point Likert scale ranging from 1 to 3.

Informed Written Consent and Ethical Approval

Written consent was sought from volunteers by asking them to voluntarily sign a register following a discussion on the concepts and objectives of the study. Ethical Approval was obtained from the Ethics and Research Committee of the Ekiti State University Teaching Hospital (EKSUTH/A67/2015/01/001). Gatekeepers' permission was also obtained from the Chairman, Medical Advisory Committee, Ekiti State University Teaching Hospital.

Procedure

Prior to the first embryology lecture, the students were assembled, administered with questionnaire on IQ test and randomly distributed into two groups A (n = 29) and B (n = 29), using simple random sampling technique. Copies of the questionnaire on the knowledge of human embryology (pre-observation) were also administered to them. Questionnaires were completed after explaining the concepts and objectives of the study and soliciting their cooperation and sincerity. Members of group B were assigned to take calls as student-observers alongside registrars and clinical students under the supervision of consultants in the labour ward of Ekiti State University Teaching Hospital, Ado-Ekiti, while members of group A did not take part in the observership program. All students received lectures at the same time and simultaneously with the observership of group B students. Each subgroup of group B was asked to submit reports of ten (10) deliveries to cover information on pregnant mother, process of labour and products of conception (fetus, placenta, umbilical cord, fetal membrane and amniotic fluid) in a log book (which was prepared by researchers and given to students for their reports). At the end of twelve weeks of lectures and clinical observership, all student-volunteers (in both groups A and B) were administered questionnaires on the knowledge of human embryology (post-observation). Student-volunteers in group B were also given the questionnaire for evaluation of their perception of the observership program. Responses from the four sets of questionnaires (IQ-test, pre-observation, post-observation and students' perception) were collated and analyzed using Graph Pad Prism; students' T test was used for comparison between the two groups and a statistical significance was set at $p<0.5$.

RESULTS

Socio-demographic characteristics

All the students in the class of 58 consented and participated in the study. Thirty two (55 %) were males while 26 (45 %) were females. The mean age of the student-volunteers was 18.5 years (age range of 15-20 years).

Perception of Clinical Observership as an aid to Learning and Understanding of Embryology

As shown in table 1, more than half of the students agreed that clinical observership makes the teaching of embryology appear real than abstract (68.9%; n=20), eases the reading of embryology (62.1%; n=18) and creates visual pictures of human development (51.7%; n=15). Concerning inclusion as a component of teaching methodology; 62.1% (n=18) agreed that clinical observership is appropriate, 17.2% (5) disagreed while 20.7% (6) were indifferent. Also, 62.1% (18) agreed that post-delivery anthropometric evaluation of products of conception was appropriate, 24.1% (n=5) disagreed while 20.7% (n=6) were indifferent.

On the perception of incorporation of clinical observership as a teaching methodology in embryology, 51.7 % (15) agreed, 37.9 % (n=11) disagreed while 10.3 % (3) were indifferent.

Table 1: Perception of students-volunteers' to Clinical observership in improving learning

Variables	Responses		
	Agreed *N* (%)	**Indifferent *N* (%)**	**Disagree *N* (%)**
Makes the teaching of embryology appear real than abstract	20 (68.9)	3 (10.3)	6 (20.7)
Eases reading of embryology	18 (62.1)	2 (6.9)	9 (31.0)
Creates visual pictures of human developmental processes	15 (51.7)	4 (13.8)	9 (31.0)
Observership of labour and delivery related obstetric procedures is an appropriate component of clinical observership	18 (62.1)	6 (20.7)	5 (17.2)
Clerkship of patients in labour is an appropriate component of clinical observership	16 (55.1)	6 (20.7)	7 (24.1)
Post-delivery anthropometric evaluation of products of conception is an appropriate component	18 (62.1)	4 (20.7)	6 (17.2)
Clinical observership should be incorporated into the Embryology curriculum	15 (51.7)	3 (10.3)	11 (37.9)

Intelligent quotient, Short and Long term effects of Clinical Observership

As seen in Figure 1, there was no significant difference (p=0.4162) in the mean IQ between the control (77±1.2) and experimental group (79±1.4). Also, there was no significant difference (p= 0.0795) in the mean pre-field test score between the control (33±1.7) and experimental group (38±1.7) (Figure 2). However, a significantly higher mean was observed in the post-field test score in the experimental (29±2.4) when compared with the control (22±1.9) (Figure 3) (p=0.0282). Analysis between the study groups showed that in the MCQs of the MB exams, there was an increase in the mean score in the experimental group (59±2.7) when compared with the control (57±2.0). However, this increase was not statistically significant (p>0.5) (Figure 4).

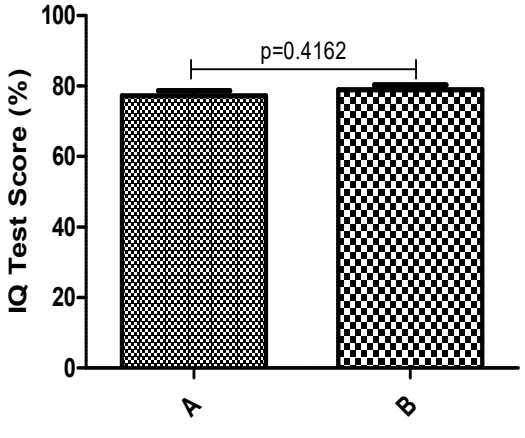

Figure 1: Percentage (%) score of IQ across the study groups. A is the control group while B represents the experimental group that did clinical observership.

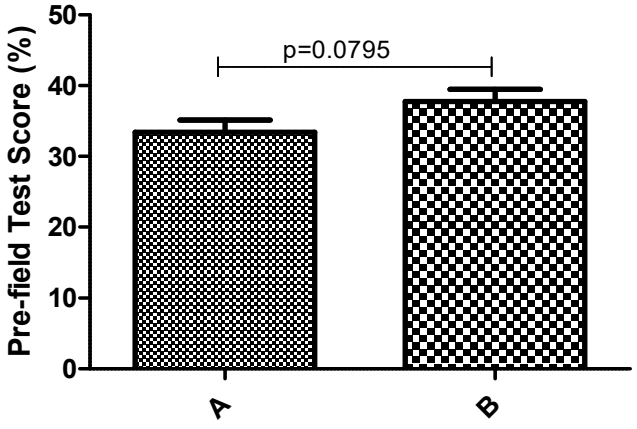

Figure 2: Result of pre-field test in percentage (%) across the study groups. A represents the control group while B is the experimental group that did clinical observership.

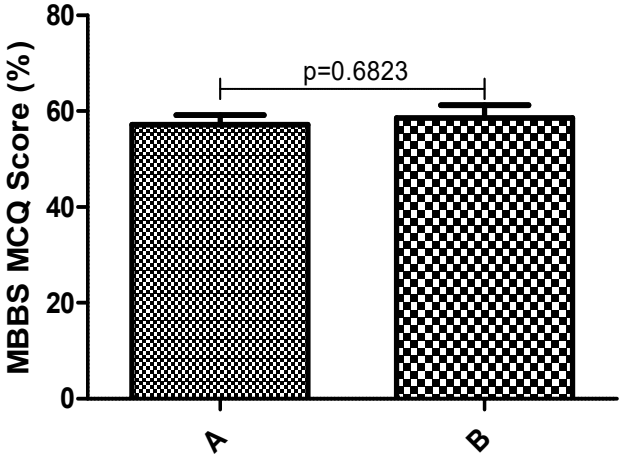

Figure 4: Result of MBBS MCQs in percentage (%) across the study groups. A represents the control group while B is the experimental group that did clinical observership

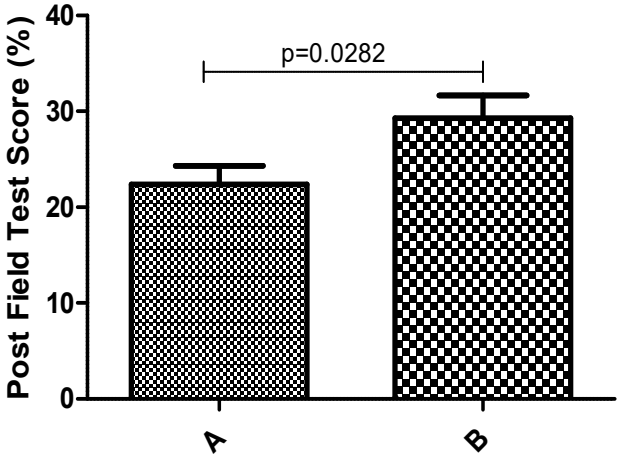

Figure 3: Result of post-field test in percentage (%) across the study groups. A represents the control group while B is the experimental group that did clinical observership.

DISCUSSION

Teaching and understanding of embryology as a course of study in the basic medical science have posed a great challenge to both teachers and students respectively (Moraes and Pereira, 2010; Lujan and DiCarlo, 2006; Chaudhary, 2018). Different teaching methods have thus been proposed by embryology teachers as medical students traditionally struggle with understanding, revising and appreciating the relevance of embryology. In this study, we examined the impact of clinical observership in the understanding and appreciation of embryology by medical students. The result of the study showed a positive impact of clinical observership in the understanding and appreciation of embryology by students.

Comparing the mean scores of the two groups for pre-test and post-test observations, the lower post-test scores for both groups with respect to their respective pre-test scores were as a result of the negative marking system introduced during the post-test observation. Once students had been taught general embryology, they were not allowed to freely guess the answers as against the pre-

test period when they were all assumed to know little. Wrong answers attracted negative marks as a punishment for guessing the answers. There was significantly higher average score in the percentage post-field embryology test score of the experimental group that undertook clinical observership compared to the control group. This is in contrast to the pre-field test score of both groups, which showed no significant difference. These results showed that clinical observership is effective as a teaching aid for embryology.

An evident improvement in the learning and understanding of embryology by students have been reported using different teaching aids such as problem and team-based learning, embryo models, three-dimensional videos and animations as well as digital educational resources among others (Carlson, 2002; Puerta-Fonollá et al., 2004; Yamada et al., 2006; Chaudhary et al., 2018; Nieder et al., 2005; Cabral and Barbosa; 2005).

It has also been suggested that the use of clinical scenario can enhance relevance and interest in embryology to students (Craig et al., 2010; Maia and Struchiner, 2010). The use of clinical cases in a virtual learning environment has been reported to be an effective tool for teaching embryology with its usage resulting in better academic performance of those students who accessed the environment and a consequent better fixation of the content of human embryology administered therein (Ramos and Struchiner, 2011; Soley and Kramer, 2001; Moxham et al., 2014). This agrees with our finding in this present study.

On a long-term scale, measured by students' performance in the MBBS professional exam, students who undertook clinical observership still maintain a high performance although with no statistically significant difference in the percentage scores across the study groups. The outcome in the long-term effect may be due to the fact that the clinical exposure was only conducted during the period of the research and did not extend till the period of the professional exam. As a result, students in the control group may have made efforts to improve their skills over time or were exposed to other teaching aids which may have contributed to their performance as there were several months between the period of observership and the final exams. Some argued that students need to learn anatomy through continuous study during a medical programme (Moxham et al., 2014). A plausible reason may also be the fact that the sample size of population is small.

The perception of students about the method of clinical observership as a teaching tool for embryology is also positive. According to our present study, a larger percentage of the students believe that clinical observership in human embryology makes the teaching of embryology appear real rather than abstract, makes personal reading of embryology easier, creates visual pictures of human developmental processes in their mind and aids learning and understanding of embryology. This is similar to findings by Ginani et al. (2012) in which students gave a positive feedback to the use of clinical cases in a virtual learning environment as an approach to teaching human embryology. Also, in the study by Scott et al. (2013) majority of students agreed that learning embryology through clinical scenarios could improve their self-directed learning skills.

The effectiveness of practical approach to the teaching and understanding of embryology is further established in this research work.

Conclusion

We conclude that "clinical observership" is an aid to learning embryology and recommend that it should be incorporated into the teaching methods of embryology in medical schools. It is hoped that necessary regulations required to facilitate such are put in place.

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Declaration of Interest

The authors declare no conflicts of interest.

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