Section: Anatomy

Original Research Article

# AN EXPERIMENTAL STUDY ON THE EFFECTIVENESS OF INNOVATIVE MODEL MAKING METHOD IN TEACHING THE DEVELOPMENT OF MIDGUT AMONG PHASE I MBBS STUDENTS

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## ABSTRACT

**Background:** Embryology - A branch of Anatomy includes development of human with complex mechanisms. Phase I MBBS students find it difficult to understand the concepts and reproduce it in assessments. The objective is to analyse the effectiveness of teaching the development of midgut by model making. **Materials and Methods:** This experimental study - Randomized control study was conducted among 150 phase I MBBS students. Students were divided into two groups by block randomization - snooze technique. 75 students in each group. Group A (study group) was taught development of midgut by model making method using coloured paper ribbons. Group B (control group) was taught by lecture using power point presentation. Duration of both the teaching methods was 2 hours and taught by the same faculty in the same day in different timings. At the end of the session both the groups were asked to fill a structured feedback using 5 point Likert scale via google forms regarding teaching methods. Data were entered in the excel spread sheet and variables were coded accordingly. The statistical analyses were performed using SPSS version 20 trial software. Data were presented as frequency with proportion n (%) for categorical data. **Result:** Significant proportion of students agreed that session was clear, interesting and relevant in study group than the control group. **Conclusion:** The study concludes that the students were able to understand the development of midgut clearly by model making method.

## INTRODUCTION

Embryology- is a branch of Anatomy, includes development of human with complex mechanisms. The knowledge in the development of human embryo is very essential for learning human anatomy and its application in clinics. Didactic teaching is the traditional pedagogy of a teacher-centered teaching strategy which involves less student engagement and learning. To make the students understand the concepts in a clear and interesting way, a new method of interactive teaching is needed. Our aim is to compare the effectiveness of innovative model making method with traditional lecture method in teaching development of midgut.

## MATERIALS AND METHODS

**This experimental study:** Randomized control study was conducted among 150 phase I MBBS students. Students were divided into two groups by block randomization - snooze technique. Institutional ethical committee approval was obtained from Government Medical College Ariyalur. Written consent was obtained from the students regarding their participation in this study.

**Inclusion Criteria**

The students who gave consent to participate in the study were included.

**Exclusion Criteria**

The students who were absent on that day and those were not willing to participate in the study were excluded.

The study was conducted among 150 students of first year MBBS students. Students were divided into two groups by randomization - Snooze technique. Each group had 75 students and they were named as Group A and Group B. Group A was taught development of midgut by model making method using coloured paper ribbons and chart. Group B was taught by traditional classroom lecture method using the power point presentation.

In model making method, Group A students were demonstrated the rotation of midgut in stages using coloured ribbon papers and chart. Red coloured paper roll was considered as superior mesenteric artery which is an axis artery for the developing midgut. White coloured ribbon paper was considered as pre-


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arterial segment which was cranial to the axis artery and green coloured ribbon paper was considered as post-arterial segment of midgut which was caudal to the axis artery. A hole was created in a white chart which was considered as umbilical opening. During sixth week of intrauterine life, as a result of the rapid growth and expansion of the liver, the abdominal cavity temporarily becomes too small to contain all the intestinal loops, and they enter the extraembryonic cavity in the umbilical cord as physiologícal umbilical herniation. During the l0th week of intrauterine life, herniated intestinal loops begin to return to the abdominal cavity.

In first stage, the pre-arterial (white) and post-arterial (green) segments around the axis artery rotate 90° counter clockwise direction by that they attained the right and left position outside the hole in the chart (in the extra coelomic cavity). Stages II and III take place simultaneously as 180° counter clockwise direction. During these stages, jejunum (pre- arterial segment) is first part enter into abdominal cavity which occupies the left side, followed by ileum and duodenum. In post arterial segments except caecal bud enter the abdominal cavity and occupies the right side. Caecal bud is the last organ to enter the abdominal cavity.

All these stages of midgut rotation was demonstrated to students using pre-recorded videos done by faculty. Then the students were asked to do on their own with the guidance of the faculty. Each and every stage was monitored by the faculty till the end.

Two groups were allocated two different places and the sessions were taken for two hours by a same faculty at two different timings in a single day.

The gain in knowledge was assessed by prevalidated multiple choice questions in both groups.

At the end of each session feedback about traditional lecture and model making method using likert scale were collected from students via google forms separately.

**Statistical analysis:** Data were entered in the excel spread sheet and variables were coded accordingly. The statistical analyses were performed using SPSS version 20 trial software. Data were presented as frequency with proportion n (%) for categorical data. Fisher's exact test was used to compare the proportions between the two groups. Mann Whitney U Test was used to compare the mean rank between the study group and control group for test scores. $p<0.05$ was considered statistically significant.

## RESULTS

Students from both groups participated and responded to the questionnaires given in a graded manner from strongly agree to strongly disagree using likert scale.

1. Strongly agree
2. Agree
3. Neutral
4. Disagree
5. Strongly disagree

**The responses were received under the following headings:**

1. The Session was thought provoking
2. The session has made me to understand the embryological basis of the clinical condition
3. The Session was relevant
4. The Session was interactive, short and made me to learn better
5. The Session was clear and understanding
6. The Session has made me confident in answering embryology questions.

**Table 1: Comparison of 'session was thought provoking' responses between control and study group.**

| S. No | The session was thought provoking | Control group (N= 75) | | Study group (N=75) | | Fisher exact value | df | P value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | n | % | | | |
| 1 | Strongly agree (n=66) | 27 | 40.9 | 39 | 59.1 | 4.57 | 4 | 0.342 (NS) |
| 2 | Agree (n=61) | 34 | 55.7 | 27 | 44.3 | | | |
| 3 | Neutral (n=11) | 6 | 54.5 | 5 | 45.5 | | | |
| 4 | Disagree (n=4) | 3 | 75 | 1 | 25 | | | |
| 5 | Strongly disagree (n=8) | 5 | 62.5 | 3 | 37.5 | | | |

Data are expressed as n (%). Fisher's exact test was used to compare the proportions between the groups. NS =Not significant.

**Table 2: Comparison of 'The session has made me to understand the embryological basis of the clinical condition' responses between control and study group.**

| S. No | The session has made me to understand the embryological basis of the clinical condition | Control group (N= 75) | | Study group (N=75) | | Fisher exact value | df | P value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | n | % | | | |
| 1 | Strongly agree (n=82) | 42 | 51.2 | 40 | 48.8 | 1.445 | 3 | 0.852 (NS) |
| 2 | Agree (n=64) | 31 | 48.4 | 33 | 51.6 | | | |
| 3 | Neutral (n=3) | 2 | 66.7 | 1 | 33.3 | | | |
| 4 | Strongly disagree (n=1) | 0 | 0 | 1 | 100 | | | |

Data are expressed as n (%). Fisher's exact test was used to compare the proportions between the groups. NS =Not significant.


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**Table 3: Comparison of 'The session was relevant' responses between control and study group.**

| S. No | The session was relevant | Control group (N= 75) | | Study group (N=75) | | Fisher exact value | df | P value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | n | % | | | |
| 1 | Strongly agree (n=84) | 41 | 48.8 | 43 | 51.2 | 3.114 | 4 | 0.671 (NS) |
| 2 | Agree (n=60) | 31 | 51.7 | 29 | 48.3 | | | |
| 3 | Neutral (n=4) | 3 | 75 | 1 | 25 | | | |
| 4 | Disagree (n=1) | 0 | 0 | 1 | 100 | | | |
| 5 | Strongly disagree (n=1) | 0 | 0 | 1 | 100 | | | |

Data are expressed as n (%). Fisher's exact test was used to compare the proportions between the groups. NS =Not significant.

**Table 4: Comparison of 'The session was interactive and short made me to learn better responses between control and study group.**

| S. No | The session was interactive and short made me to learn better | Control group (N= 75) | | Study group (N=75) | | Fisher exact value | df | P value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | n | % | | | |
| 1 | Strongly agree (n=94) | 49 | 52.1 | 45 | 47.9 | 1.857 | 3 | 0.674 (NS) |
| 2 | Agree (n=49) | 24 | 49 | 25 | 51 | | | |
| 3 | Neutral (n=6) | 2 | 33.3 | 4 | 66.7 | | | |
| 4 | Strongly disagree (n=1) | 0 | 0 | 1 | 100 | | | |

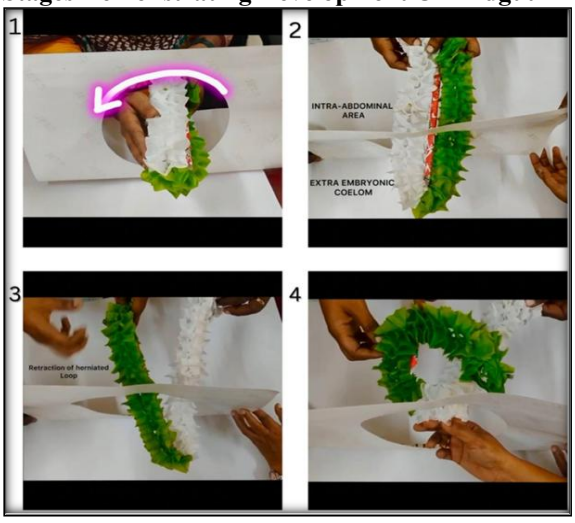
Data are expressed as n (%). Fisher's exact test was used to compare the proportions between the groups. NS =Not significant.

**Table 5: Comparison of 'The session was clear and interesting' responses between control and study group.**

| S. No | The session was clear and interesting | Control group (N= 75) | | Study group (N=75) | | Fisher exact value | df | P value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | n | % | | | |
| 1 | Strongly agree (n=75) | 46 | 61.3 | 29 | 38.7 | 9.31 | 3 | 0.015* |
| 2 | Agree (n=67) | 25 | 37.3 | 42 | 62.7 | | | |
| 3 | Neutral (n=7) | 4 | 57.1 | 3 | 42.9 | | | |
| 4 | Strongly disagree (n=1) | 0 | 0 | 1 | 100 | | | |

Data are expressed as n (%). Fisher's exact test was used to compare the proportions between the groups. *indicates $p<0.05$ and considered statistically significant.

**Stages Demonstrating Development Of Midgut**

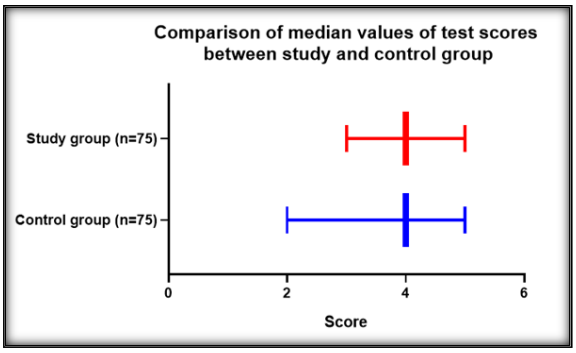



Data are expressed as median with interquartile range. Mann Whitney U test was used to compare the mean ranks between the groups. *indicates $p<0.05$ and considered statistically significant.

**Inference:** No significant difference was noted between control and study group in terms of thought provoking, relevancy, easy to understand the concept, inter-activeness and confidence in answering the questions related to embryology

Significant proportion of students agreed that session was clear and interesting in study group than the control group.

Test scores were significantly higher in study group than the control group indicating that intervention method has significant impact in students' understanding the concept (p=0.032*).




## DISCUSSION

The different teaching modalities like lectures, group discussions, learning by demonstrations, role playing, technology based learning and their effectiveness among the students were studied by many scholars. In this study, most of the students have responded in a positive manner. Mallashetty et al(2015) in their study on "Model making exercise-A new tool for teaching and learning anatomy and perception of students towards it" concluded that all the students agreed that the session was 'Interactive, short and made them to learn better'.


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**Table 6: Comparison of responses about the session with previous studies**

| Author's name / Parameters | Mallashetty et al | Ayman Mustafa et al | Uma et al (2022) | Vipin Garsa 2017 | Claudia et al | Present study |
|---|---|---|---|---|---|---|
| Interactive, short and made me to learn better | 100% | 92.4% | 87% | - | - | 93.3% |
| clear and understanding | - | - | - | 94 % | - | 94.6% |
| Confident in answering embryology questions | - | - | 91.39% | - | 81 % | 94.6% |

## CONCLUSION

Most of the students strongly agreed that this innovative model making method of teaching was clear and interesting, relevant about the development of midgut. In this method of teaching, students actively participated enthusiastically throughout the session. Ultimately the students were able to understand the concepts in an easy manner. At the end of the session they were able to answer most of the questions relevant to the topic which made this study successful.

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