

Play dough as a teaching tool in the development of cardiovascular system for small group teaching

Ashwini Balasaheb Nuchhi¹, Sandhya Vikas Yatagiri², Veena Srinivas Harwalkar³, Rudragouda S Bulagouda⁴

ABSTRACT

Introduction- Teaching embryology in particular cardiovascular system (CVS) is challenging one with didactic lectures. Multiple modes of teaching by videos, using embryology models and making models by play dough facilitate the better understanding and retention of subject. **Aims/objectives-** To make the students understand various developmental stages of CVS clearly and retain that knowledge. **Methodology-** The development of CVS was taught by using videos, embryology models and making models by play dough to total of 75 students which were divided into small group of 25, after the class feedback was taken by the students to assess which method is better for teaching embryology of CVS. **Results and Discussion-** 50(66.7%) students opined that play dough models were helpful in understanding the developmental stages clearly with significant P value=0.038*. 74(98.7%) students found this method of teaching with play dough interesting with significant P value <0.001*. **Conclusion-** Play dough models can be used to teach small groups about development of CVS effectively.

KEYWORDS- Play dough, embryology, cardiovascular system, congenital anomalies

INTRODUCTION

A thorough knowledge of human embryology is a basis for the precise diagnosis and proper treatment of various congenital clinical entities. However, it is neglected by 1st year MBBS students because of short period of course, as the time allotted to traditional basic science disciplines is reduced. The subject as such is complex one to learn and memorize in a busy modern medical curriculum and can be easily overlooked (1,2,3). The traditional teaching by didactic lectures makes the students a passive receiver of information whereas adopting innovative and even exciting methods seems essential to generate motivation and positive attitude in students (4,5,6).

Teaching embryology especially cardiovascular system is challenging one with didactic lectures as students may find it complicated to imagine 2D figures in 3D configuration, spatial visualization is must for clear understanding of embryology (7). 3D learning tools like videos (8), embryology models (9,10) and models made by play dough (11) help for the better understanding and long-term retention of subject.

Hence, we present a method of teaching embryology by making models of different embryological stages from play dough. The aim of present study was to make the students understand various developmental stages of CVS and congenital anomalies clearly.

Different materials are available for making anatomical models (12, 13, 14). We preferred play dough as it is cheap, easily available with different colours.

MATERIALS AND METHODS

This was Prospective cross-sectional study done by teaching the developmental stages of CVS by making play dough models to 75 students which were divided into 3 small groups each comprising of 25 students, after the class feedback was taken by the students to assess which method is better for teaching embryology of CVS. The study was done in the Dept of Anatomy This innovative teaching session was done after the regular theory class on development of CVS where videos will be shown routinely.

We preferred play dough used by kids for playing as it is cheap, easily available, with different colours, simple to use, errors in making can be corrected and can be reused several times if stored in airtight containers. The developmental stages of CVS including formation of two endothelial heart tubes and fusion of two tubes into one, formation of cardiac loop, formation of sacculations, formation of inter-atrial, inter-ventricular, atrio-ventricular septae, development of atrial and ventricular chambers and congenital defects of clinical importance like atrial septal defects, ventricular septal defects, transposition of great vessels, congenital aortic stenosis (15) were taught by making play dough models as shown in fig-1. The teaching session was for 2 hours between 3-5pm in the afternoon. The same portion was taught to 3 different groups consisting of 25 students on 3 different days. The feedback was taken using a structured questionnaire from students after each session, and each question in the questionnaire was analysed separately. Most of the students enjoyed the learning session and they participated actively.

Table -1. Questionnaire

1) Is this helpful in understanding the developmental stages clearly?
2) Can you have the 3D view with these models?
3) Which method is better for 3D orientation ?
4) Which method is better in teaching embryology?
5) Did you enjoy this type of teaching method?
6) Are you interested in making such models?
7) Can we use this method of teaching embryology using play dough routinely?
8) What is the disadvantage of this teaching method?

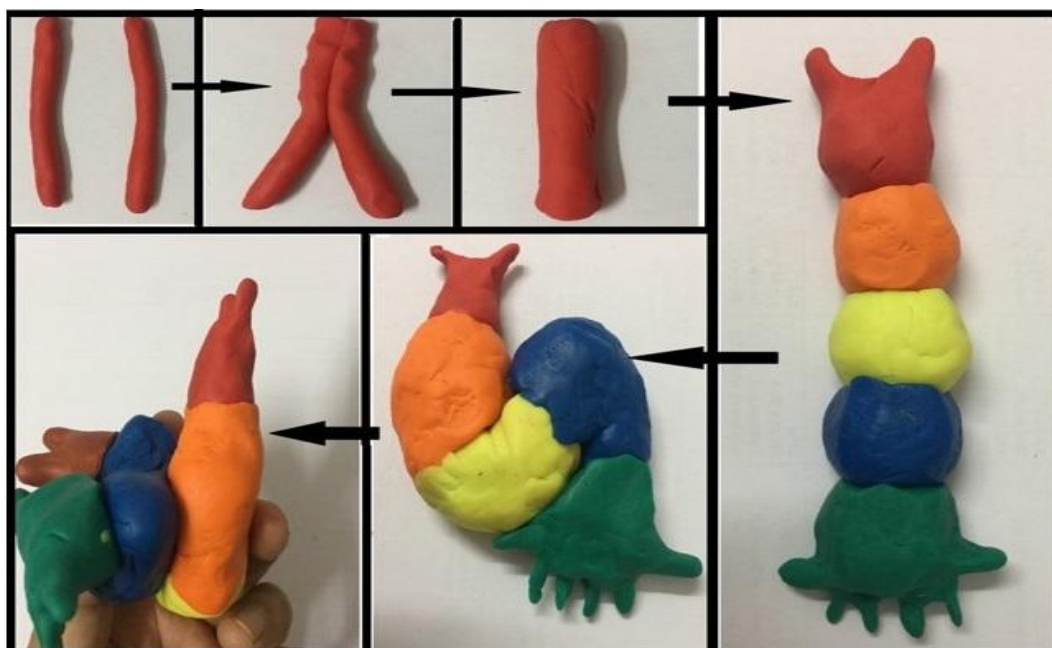


Figure-1.Shows some of the models prepared during teaching session.

STATISTICAL ANALYSIS-All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean± standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and diagrammatic presentation. Chi-square (χ^2) test was used for association between two categorical variables.

RESULTS-

Table-2. Questions in the feedback form were statistically analysed depending on type of questions.

Questions asked	Yes		No		p value
	N	%	N	%	
Helpful in understanding the developmental stages	50	66.7%	25	33.3%	0.038*
Can you have the 3D view with these models?	73	97.3%	2	2.7%	<0.001*
Did you enjoy this type of teaching method?	74	98.7%	1	1.3%	<0.001*
Are you interested in making such models?	49	65.3%	26	34.7%	0.057
Can we use this method of teaching embryology using play dough routinely?	70	93.3%	5	6.7%	<0.001*

Note: * significant at 5% level of significance (p<0.05), N-No. of students.

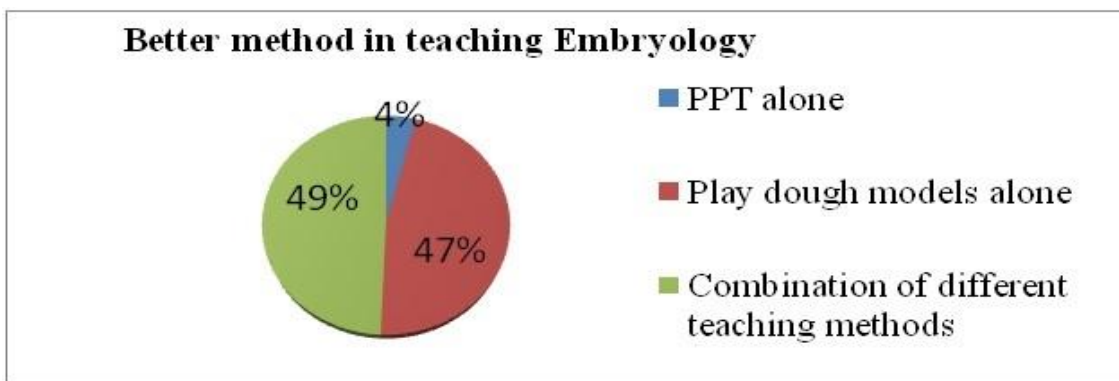


Figure-2. Pie chart shows-Which is the better method for teaching embryology?

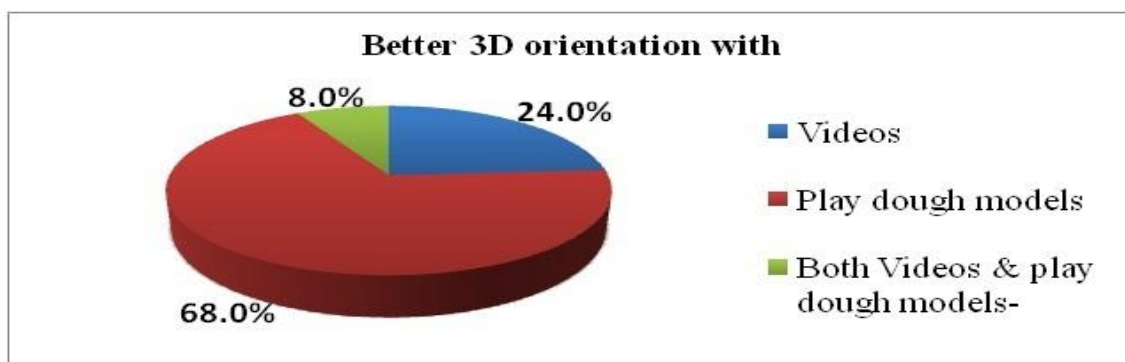


Figure-3. Pie chart shows-Which method gives better 3D orientation in teaching embryology?

Table-3. Disadvantages of teaching with play dough as opined by students

	Disadvantages	No of students	Percentage
1	Models are small and not labelled	16	21%
2	Play dough may be Toxic	2	3%
3	Time consuming	5	7%
4	Better for small groups	6	8%
5	Needs prior practice	1	1%
6	No comments	45	60%

DISCUSSION-

Teaching by the didactic lectures fails to impart huge amount of knowledge within a stipulated time in a way it is retained and interpreted efficiently by the students. Hence medical education has adopted different teaching learning methods with a changing medical curriculum. The studies worldwide have shown that multimodal teaching learning methods were the preferred over unimodal among medical under graduates. In the unimodal presentation most, preferred one is kinesthetic type of learning along with visual, aural and read write in less extent. (16, 17)

Play dough is used by various medical researchers and educators as a kinesthetic tool in teaching and also learning various complex structures in the body as well as their functions. (13, 14, 18)

A comprehensive knowledge of anatomy requires visuospatial information of anatomical structures, which is the ability of a person to apprehend shapes, forms and positions of structures, process and mentally manipulate spatial forms in two- and three-dimensions. Visuo-spatial ability is highly correlated with performance on spatially-complex surgical procedures. (7, 19, 20)

Eftekhar B et al 2005- Residents and consultants made the preoperative models of cerebral aneurysm based on cerebral angiograms in order to document what they are going to see and postoperative models what they have seen during operation. (13)

Manners R M et al (2017) prepared models of eyeball to teach different levels of anatomy details with excellent feedback from students. (14)

In the present study play dough is used to construct models of different stages of heart to teach.

66.7% of students opined that teaching embryology with play dough models is helpful in understanding the developmental stages of CVS and the congenital anomalies clearly (significant P value-0.038). 97.3% of students stated that the play dough models can give spatial or 3D orientation (significant P value<0.001). 98.7% students found it interesting to learn the complex stages of development of CVS in a simpler way and most of the students are interested in making such models.

Still, this method of teaching embryology has some disadvantages as stated by students like the models are small and not labeled, not suitable for large group teaching (21%), time consuming, might be toxic, teacher should be an expert in making models.

CONCLUSION

Play dough can be used as teaching tool to teach small groups about development of CVS and related congenital anomalies effectively. However, for large groups combination of different teaching methods is very effective.

LIMITATIONS

This method of teaching can be used to teach development of different systems in the body, we have mainly concentrated on development of heart in this study.

Conflict of Interest-NO

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