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Research Article

**A RESEARCH TO STUDY VENTRICULAR AND ATRIAL  
ALTERATIONS CONDUCTED ON VAPOR-EXPOSED  
EMBRYOS OF THE CHICKEN**<sup>1</sup>Dr. Samia Rahman, <sup>2</sup>Dr. Sana Suleman, <sup>3</sup>Dr. Nida Afzal<sup>1</sup>House Officer DHQ Teaching Hospital Gujranwala.**Abstract:**

**Objective:** The main purpose for which the study is arranged is to describe the vapour pressure effect of alcohol on the growth and progression of the atrial and ventricular partition of the embryo of chick.

**Methods:** The study was of a tentative type which was conducted in the timeframe of February to October 2017 at Jinnah Hospital, Lahore. Mainly two classes of patients were formulated. These classes were tentative and control groups. These two groups were further separated into three subclasses on the foundation of surrender. Ethanol vapours were originated in a specifically fashioned vapour compartment. These ethanol vapours were given to the tentative group and then matched with the control group.

**Results:** Ninety eggs were given to the investigators of each of two groups. It was observed that inter-ventricular separation was finished after the 7 days of embryos growth. Because of the disclosure of chick embryo to ethanol vapour pressure, a small irregularity was observed at the 10th day of embryos growth. It was considered as the fault of ventricular partition since ventricular maturity is fulfilled in 7 days. Small perforated interatrial partition was formulated in 7 days which remain as it is until chicken emerges out from the egg.

**Conclusion:** It was concluded from the study that by exposing chick embryo to ethanol vapour pressure a ventricular portioning fault was obtained.

**Keywords:** Chick Embryo, Ethanol Vapors Exposure, Ventricular Defect.

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**INTRODUCTION:**

Alcohol is very harmful. It interferes with the development of chick embryo and causes defects in birth. So, it is considered as the teratogenic agent. Now a day's people are well aware of the dangers of using alcohol during the pregnancy period. But the dangerous effects of a gas of ethanol vapours are not well comprehensible by the common men [1]. A particular gadget called Alcohol without Liquid Vaporizer (AWOL) is used to breathe in ethanol vapours. The makers of the alcohol vapours are of the point of view that ethanol vapour breathing is not precarious for wellbeing. But its dangerous effects proved by the most modern exploration [2].

Disclosure to ethanol during the pregnancy causes rigorous growth irregularities in the brain and heart [3, 4]. If the ethanol vapour is given to the parent before the birth of the offspring it may cause growth deficient heart in the offspring from its birth [5]. To study the hazardous effects of alcohol on the newborn chick embryo is the best tool for study. It is now largely used as a mammal model for various growth studies [6].

The recent study was organized to detect the changes in growth of interatrial and interventricular partition due to their interaction with ethanol vapour pressure. The experiment was performed on the embryo of chick.

**MATERIAL AND METHODS:**

The study was of a tentative type which was conducted in the timeframe of February to October 2017 at Jinnah Hospital, Lahore. For analysis "Desi" chicken eggs were chosen. These eggs were unruffled from the Poultry Institute Punjab, Rawalpindi. The eggs were classified into control group A and tentative group B. Ethanol vapours were given to the group B. Three more groups were formulated from each main group who were given the names 1,2 and 3. The heat given to the eggs was fixed at 102°F. 70 to 80% moisture was also provided to the eggs during experiment [7]. The day at which the eggs were given the specific heat and moisture to start the experiment was supposed to be day 1. Fractured and chilled eggs were also added to the study. At day 7 subgroup 1 was sacrificed, at day 10 subgroup 2 was sacrificed while subgroup 3 was sacrificed after 22 days. At day 22 chicks come out from the egg. When we cracked the egg a great heart vessel can be seen. This heart

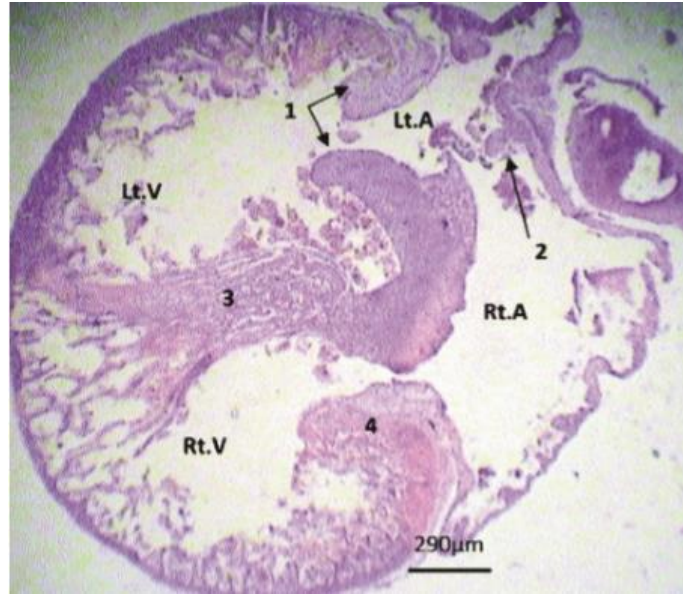
was then separated from the rest of the embryo and preset, processed and then implanted in paraffin. This was implanted in the paraffin to spaced successive parts of 15 to 20 mm depth. To check the irregularity in the septum successive parts of the heart were taken. To observe the tissue level observation of interatrial and interventricular partition, a minimum 6mm wide slice was required. All the slices which had been undergone experiments were first stained with Haematoxylin and Eosin.

0.75mg/l to 1.5mg/l ethanol was required for group B. Specially formulated machinery was used to create ethanol vapours and then these vapours were transferred to an incubator. A breathalyzer was used to calculate the altitude of vapours in the incubator [7]. Ethanol vapours were given from day 1 to day 6 to the subgroup 1 and on the 7th day, they were surrendered. From day 1 to day 9, subgroup 2 was disclosed in front of ethanol vapours and surrendered at day 10. While ethanol vapours were given to the subgroup 3 from day 1 to day 9 and surrendered on the day of exposing of the chick from the mother or 22nd day.

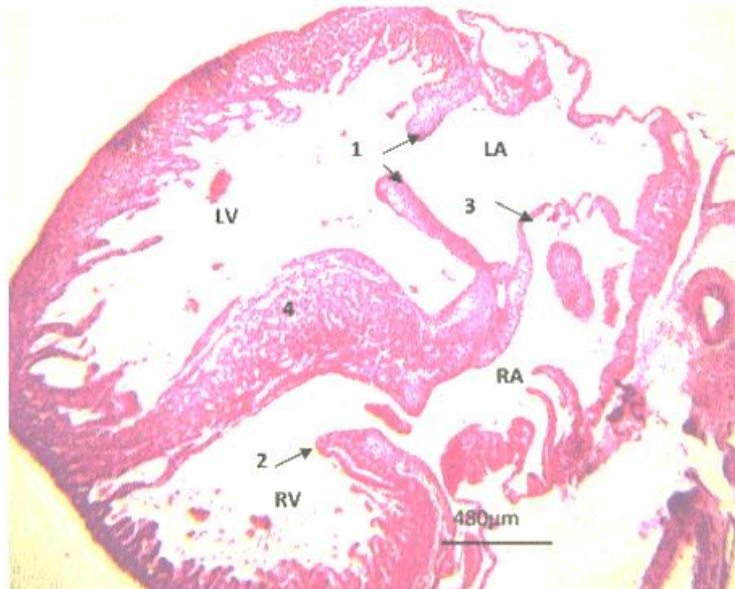
**RESULTS:**

There were 30 eggs present in every subgroup. It means that each major group contained 90 eggs. In group A1 the chick embryo was observed after 7 days. 4 heart compartments were found at that stage: right atrium, left atrium, right ventricle and left ventricle.

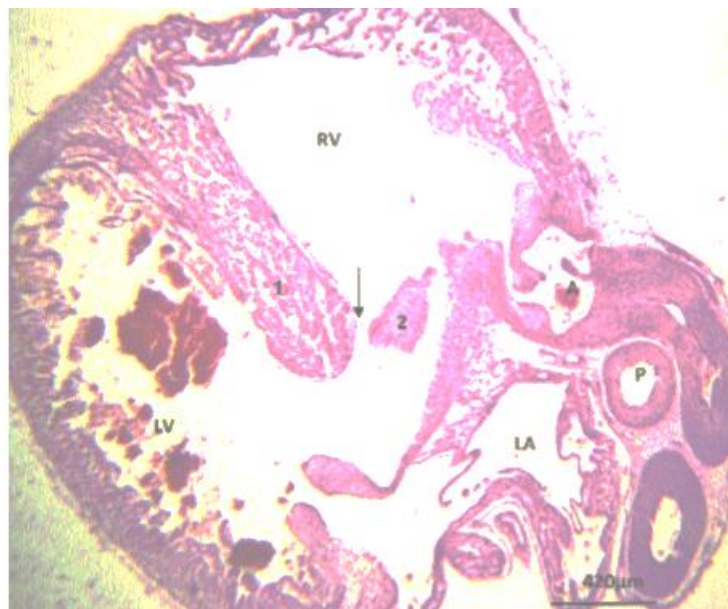
In figure 1 complete partition of ventricles was shown. Interventricular partition composed of two parts: muscular part and membranous part. In the lower part of the interventricular partition, a circular nucleus was present. This nucleus was not bounded by cell borders. Nuclei were insecurely present in a network of the stringy atmosphere. Some elongated nuclei were also observed in addition to normal circular cells. Various forms of nucleus-like circular, lengthened, fusiform and trampled were observed in the upper forth part of the interventricular partition. These nuclei were found to be present in between the network of the stringy atmosphere. On both sides of the ventricular partition lines of endothelial cells were present. This endothelial coating was uninterrupted with the endothelial cells coating the trabeculated fraction of the ventricular barrier.



**Figure – I:** Day 7 control chick heart viewing two cusps of left atrioventricular valve(1), interatrial partition(2), interventricular partition (3), right atrioventricular regulator(4), left atrium (Lt. A), right atrium (Rt. A) Left ventricle (Lt.V) and right ventricle (Rt.V). Haematoxylin and Eosin staining.



**Figure – II:** Day 10 control chick heart screening left ventricle (LV), right ventricle (RV), left atrium (LA), right atrium (RA), left atrioventricular tap (1), right atrioventricular tap (2), interatrial partition (3) and interventricular partition (4). Hematoxylin and Eosin staining.



**Figure – III:** Alcohol-exposed day 10 chick heart showing left ventricle (LV), left atrium (LA), right ventricle (RV), aorta (A) and pulmonary trunk (P). Arrow is showing the small opening between muscular (1), and membranous part of this septum (2). Haematoxylin and Eosin staining.

Septum primum involves in the creation of interatrial separation. Interatrial separation is opened in some places. Small holes are present in the septum. Nuclei are also present in interatrial separation lacking well-organized boundary. On its, both sides compressed endothelial cells are present. Group B1 had histology related to control group A1.

Day 10 atrial separation contained many holes in the central part. In day 10, ventricular septum was fulfilled in both tentative group B and control group A excluding only one case. Interventricular separation was made up of circular to elliptical nuclei having no definite cell wall layer. This observation was made by examining the regular sequences of the heart segment. This fragment of the separation was covered with compressed endothelial on every side. Both the ventricular compartments were present in regular fashion on the upper lining of the separation and also on the lower side of the atrioventricular association. Infractures observed in the later time period, a small segment of the interventricular partition was seen rising just beneath the atrioventricular association. It contained many types of nuclei spreading between the networks of the eosinophilic atmosphere. The nuclei were of many forms like circular, egg-shaped, longer, fusiform and compressed. In subsequent separations, this part of membrane makes a connection with muscular parts.

In comparison with B3 group, the chicks of A3 groups had similar tissues study. In both small groups, atrial separation was not finished.

#### DISCUSSION:

Interventricular partition has two main parts in case of the embryo of chick. These two parts are muscular septum and membranous septum. It was observed in the recent study that ventricular separation had finished after 7 days. Both the muscular and membranous partitions associated with each other after the completion of ventricular partition. One study concluded that previous ventricle becomes equally trabeculated. It also had vastly ordered sheets of myocytes coated with cells of heart walls. At the arrival of the 7th day of incubation trabecular sheets linked [8]. It forms the muscular ventricular partitioning. This ventricular classified the previously present ventricle into right and left ventricles. The interventricular separation moves towards the atrioventricular stifle. Here it initiates fusion. After fusion, a small gap was left behind which is known as the interventricular canal. It occurred between the left and right ventricle. More tabular sheets than combine with the previous one and development of ventricular separation enhanced. One study was of the point of view that completion of ventricular separation occurred between day 7 and 8 [9]. It was also observed that ventricle finished its septation at day 7. The part of the interventricular septation that distinguishes the flow of right and left ventricles is not made up of connective tissue. This part was made up of connective tissues in the case of humans. But still, it is comparable to the membranous segment of

the human interventricular partition. This region was thought to be composed of different embryological gears [10]. It was identified by the observations of the recent study that septum premium combines to create the interatrial partition. This partition has small holes in it and not properly sealed. These holes remained prominent until the birth of chicken from the embryo. Our results were comparable to earlier studies also. It was observed in the earlier studies that interatrial partition of the chick was made up of just septum premium and it has been finished after hatching. It was also observed that septum secundum was not involved in the formation of interatrial partition [11]. Ethanol is harmful to both humans and animals. Its teratogenic effects were well known in the entire world from the past few years. Alcohol causes the complexities at the time of birth in humans and other animals. It should be neglected to avoid prebirth disorders like Foetal Alcohol Syndrome (FAS) [12]. All functions of the body including the central nervous system, brain, gastrointestinal tract, and cardiovascular system are suffering because of FAS [13]. Children having FAS shows 50% cardiovascular disorders [13, 14]. Atrial septum commonly showed cardiac defects. If the chicken's embryo were brooded with 0.20ml of ethanol it may cause the 43% abnormalities in ventricular separation. If the embryos of the chicks were disclosed to a higher amount of ethanol about 0.4ml it may cause 74% chances of defects in aortic and ventricular separation [15]. In our study, on the 10th day of incubation of eggs, it was observed that one chick was formulated only of the muscular part of the partition. This was entangled by endothelium cells from all sides. Both the separations of ventricles were present regularly, above the upper limitations of the septum defects in the body due to the disclosure of embryo to ethanol. Ethanol can enhance the numbers of reactive oxygen in the body of an individual. This oxygen may prove hazardous for larger molecules present in the body and causes cell destruction and ultimately death [16]. The other helping process for the production of a reactive oxygen molecule is the reduction of endogenous-antioxidant systems in the body. The main antioxidants present in the body are glutathione, ascorbic acid and catalase. It has been identified by the study that we can reduce the irregularities caused by antioxidant by reducing the ethanol amount [17].

Decreased amount of ethanol can cause cell damage or even death [18, 19] Damage of cell is called apoptosis Neural crest cells are the special types of cell which are involved in the cardiac progression. Ethanol also damages these neuronal cells. Destruction or death of these cells causes newborn and other changing in cardiac [20].

The character of genes in susceptibility towards ethanol pathogenicity was also studied. One study reported that various parts of the mice gave a similar quantity of alcohol but their effects on different parts of the body differ greatly. These differences were because of genetic pressure [21]. Maternal effects are not involved in such type of behaviours. Another study was organized on three strains of the chick embryo. In this study, it was noticed that genes were involved in defects of ethanol on cardiac. One strain was identified which were concerned about the destruction of neural crest cells. But this strain did not harm the heart and aorta. Movements of neural crest cells and backward flow of was important for the replenishment of the lost cells. Their movement and function also remain constant and strain did not affect them. The second strain did not show any irregularities in the heart cells. However, the third strain showed some defects. It may cause a slender condensed layer of the ventricle, dilatation, decreased deoxyribonucleic acid, and protein substance. This physical appearance showed the irregular maturation of myocardium [22]. The current study reached the conclusion that hereditary makeups greatly change the results of ethanol disclosure of parents.

It was concluded in the following study that appearance of ventricular partitioning defects in chick embryo of 10 days could be because of hereditary makeup. Chick embryo showed diverse susceptibilities when they were given the same amount of ethanol. This was due to diverse genes effects.

#### CONCLUSION:

It was concluded from the whole study that interventricular defects were caused by ethanol disclosure during growth of the embryo.

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