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Morphological Study of the Skeleton Development in Chick Embryo (*Gallus domesticus*)

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Abstract: The study comprised anatomical description of skeleton development in chick embryo *Gallud domesticud* which includes the appearance of ossification center during the embryological stages (5,10,14, 18 and 21) days. It was found that some of skull bones was formed by intramembranous ossification and that other by endochondral ossification. During the hatching, the skull was undergo complete ossification and there is a symmetry between the paired bones among their shape bone started with primary ossification center. The limbs were formed by endochondral ossification. The ossification begins centrally in the cartilage and proceed in all directions. The hind limbs ossified after fore limbs and there is an ossified signs in the tarsal and carpal bones before hatching. as well as, there is an obvious increases in length of primary ossification centers in both fore and hind limbs with further development. Histologically, three types of bone cells were studied, the osteoblasts, osteocytes and osteoclasts which covered by periosteium and their rules in intramembranous and endochondral ossification.

Key words: Chick embryo, skull bones, osteoblasts, osteocytes, osteoclasts

INTRODUCTION

Avian bones development and health are an important subject in avian research, especially because of its significant to the poultry industry. Every year, about 2-5% of the broilers raised are lost as a consequence of skeletal problems during growing and finishing fases due to mortality and condemnation (Sullivan, 1994). Many of the pathological skeletal deformities are still commonplace and do not appear to be linked to defined causes. Long bone distortions such as varus and valvus deformation and tibial dyschondroplasia are expressive examples for the mentioned pathologies. In addition although there are dissimilarities between human and avian bone development, the avian is considered a valuable model for human skeletal defects (Cook, 2001).

Birds mutual with other amniotes by that most of the skeleton laid down in cartilage which subsequently become ossified. Bones formed in this way are known as cartilaginous bones, as opposed to membranous \bones which are ossified directly from mesodermal tissue (Schepelmann, 1990).

Bone is remarkable for its hardness, resilience, characteristic growth mechanisms and its regenerative capacity. It provides rigid support and protection to the soft parts and furnishes a lever system on which muscles are brought into play (Potten *et al*., 1978).

The bone termed the woven bone on the first embryonic development which characterized by their immaturities and irregular collagen fibers and osteocytes contents and regards as a temporary bone, during the growth and developed stage transformed into the lamellar bone (Alder, 2000).

MATERIALS AND METHODS

Thirty chick embryo collected to investigates the skeleton development stages, they divides into five groups according to the chick embryo ages (1st : five days aged, 2nd; ten days aged, 3rd; 14 days aged, 4th; 18 days aged and 5th; one day after hatching).

The eggs were hatched in artificial incubators in 37-38°C temperature and 65 % humidity.

The following steps employed for the skeleton preparation and calcium identifications (Jenning, 1999):

- Opens the skin and removed the viscera carefully avoiding the damage in bony or cartilaginous skeleton or mesenchymal tissue.
- Fixed the embryos at 100% ethanol for 4 days without stirring and then three days with stirring.
- Imprisoned in the solution of Alizarine red and Alcian blue stain for five days with stirring, washed by tap water and imprisoned in solution of glycerol 20% with sodium hydroxide 1% in ratio 1;1 for 16 h in room temperature to removed tissue completely and stores in 15 glycerol for examined and photographed

For histological demonstration the samples were collected from (Skull, Vertebrates, Ribs, Fore and Hind limbs) then transfer into nitric acid 5% for 18 h- 3 days for decalcification.

Samples pass through a series of alcohol from 50%-100% for two hours for each concentration for dehydration. Then clearing in xylene for one and half hour .infiltration in paraffin and embedded with paraffin wax and cutting by using ratary microtome, the thickness