Cellular elements in the developing caecum of Japanese quail (Coturnix coturnix japonica): morphological, morphometrical, immunohistochemical and electron-microscopic studies

Aalaa M. AbuAli, Doaa M. Mokhtar, Reda A. Ali, Ekbal T. Wassif & K. E. H Abdalla

Abstract:

The present study aims to investigate the histological, histochemical and electron microscopic changes of the caecal proximal part of Japanese quail during both pre- and post-hatching periods starting from the 2nd embryonic day (ED) until four weeks post-hatching. On the 2nd and 3rd ED, the primordia of caeca appeared as bilateral swelling on the wall of the hindgut. On the 7th ED, the lamina propria/submucosa contained the primordia of glands. On the 8th ED, rodlet cells could be observed amongst the epithelial cells. On the 9th ED, the caeca began to divide into three parts with more developed layers. With age, the height and number of villi increased. On the 13th ED, immature microfold cells (M-cells) could be identified between the surface epithelium of the villi. The caecal tonsils (CTs) appeared in the form of aggregations of lymphocytes, macrophages, dendritic cells and different types of leukocytes. Telocytes and crypts of Lieberkuhn were observed at this age. On hatching day, the crypts of Lieberkuhn were well-defined and formed of low columnar epithelium, goblet cells, and enteroendocrine cells. Posthatching, the lumen was filled with villi that exhibited two forms: (1) tongue-shaped villi with tonsils and (2) finger-shaped ones without tonsils. The villi lining epithelium contained simple columnar cells with microvilli that were dispersed with many goblet cells, in addition to the presence of a high number of intra-epithelial lymphocytes and basophils. Moreover, the submucosa was infiltrated by numerous immune cells. CD3 immunomarker was expressed in intraepithelial lymphocytes, while CD20 immunomarker showed focal positivity in CTs. In conclusion, the caecal immune structures of quails at post-hatching were more developed than those in pre-hatching life. The high frequency of immune cells suggests that this proximal part may be a site for immunological surveillance in the quail caecum. The cellular organisation of the caecum and its relation to the immunity was discussed.

Published In:

Scientific Reports, 9:16241, NULL