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Research Article

Analysis of the liver's morphology and histology in White-Breasted Kingfisher

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Abstract

The findings of the current research study reveal that the liver of the white-breasted kingfisher exhibits a bilateral division, The right lobe exhibits a relatively greater size in comparison to the left lobe. The liver is completely concealed by an inconspicuous layer of connective tissue credited as the Glisson's capsule. The liver is formed out of hepatic cell cords or plates fact divide in a radial direction surrounding the central vein. The hepatic cords have been separated by a minute aperture pointed to as the blood sinusoids, which are marked by the presence of two distinct cell types along their lining the endothelial cell, and the Kupffer cell. In the current research study, 6 birds were used, and for the purpose of obtaining the liver, the birds were dissected, the liver was removed, and it was placed in a fixative solution for 24 hours. The bird under study has a liver consisting of two lobes, the right of which is the largest and contains the gall bladder. Histologically, the liver consists of a series of hepatic cords separated from each other by blood sinusoids.

Keywords: White-breasted kingfisher, liver, descriptive morphology, histological organization

Introduction

Hepatic cells are vital to the body's ability to secrete both internally and externally, remove blood toxins, and clear the body of foreign objects via their passage through the sinusoids. Furthermore, The liver requires a pivotal role in the ontogeny, of the foetus due to the fact that it serves as the

primary location for hematopoiesis, or the generation of blood cells (Victor, 2005; Luiz &Jose,1974). With a few exceptions, such as the absence of lobules and the barrier between them, the overall tissue composition of the liver in birds is similar to that of mammals (Hodges,1974; Hodges,1972; Afzeline,1965; Allen et al,1970). From an anatomical concept perspective, the liver can be anatomically isolated into two distinct lobes, namely the right and the left lobes. It is important to mention that the liver's right lobe is generally observed to be bigger liver in size compared to the left lobe (Al-Zaidi, 2000; Ibraheem, 2008).

In the context of domestic fowl and turkey, it has been observed that the right lobe is the largest. Furthermore, the left lobe can be further separated into distinct dorsal and ventral sections (Whitlow,2000; Caceci,2006). The liver's left lobe is responsible for covering the proventriculus and some sections of the gizzard. However, The liver's right lobe covers the pancreas, the initial segment of the duodenum, and a portion of the small intestine(Al-Zaidi,2000). Numerous researchers have examined the liver; AL-Zaidi examined the liver of the *Columba livia gaddi* (rock pigeon) (Al-Zaidi,2000). The objective of this research project is to provide a comprehensive understanding of the morphology and histological makeup of the liver in white hens (Ibraheem,2008). Selman examined the liver of *Fulica atra*, a coot bird (Selman, 2013). Abd Ali and Ghyadh examined the male *Anas crecca* bird's life (Abdali & Ghyadh, 2016). The liver of broilers was investigated by Al-Nassiri and Ebraheem from the first day of hatching to sexual maturity (Al-Nassiri &Ebraheem,2013).

Material and methods

The collected specimens of white-breasted kingfisher that were utilised in this investigation were obtained from a local marketplace inside the urban confines of Baghdad city. The identification of the materials was conducted using the classification keys that were previously published (Al-Lous,1960). To obtain the liver, the birds were dissected, the liver laying was found and its morphological qualities were taken out. The liver was then fixed for 24 hours using a fixer (Aqueous Bouin's fluid). The histological investigation procedure involves embedding paraffin wax on slides to a degree of fusion (58-60c) as per the method (Bancroft &Steven 1982). The sections are then sectioned to a thickness of 5 µm and stained using Hematoxylin and Eosin as per method (Humason,1979).

Results and disscussion

The currently underway research reveals the findings and subsequent discussions, the liver of the white-breasted kingfisher has a bilateral asymmetry, The right lobe exhibits a somewhat bigger size

in comparison to the left lobe, as depicted (in Figure 1). This observation aligns with previous investigations on avian liver morphology (Al-Zaidi, 2000; Ibraheem, 2008; Whitlow, 2000; Caceci, 2006; Selman, 2013). The colour of the liver in the bird under research study appears to be reddish – brown and the location of the gall bladder on the right lobe of the liver, and this observation agrees with the observation of other research (Ibraheem, 2008; Whitlow, 2000).

The findings of the current study, in line with previous research (Hodges, 1974; Abdail and Ghyadh, 2016; AL-Nassiri & Ebraheem, 2013; Ross & pawlina, 2003; Klasing, 1999) indicate that the liver is enveloped by a delicate 'connective tissue' layer referred to as the Glisson's capsule (Fig. 2). The Glisson's capsule, which is rather thin, spreads from its septa, so dividing the liver into lobules that have an unclear structure (see Figure 3). The aforementioned findings align with several previous investigations (Hodges, 1974), however, they are in contrast with the findings of (Andrew & Hickman, 1974), which elucidated the presence of genuine lobulation in the liver. The liver is composed of hepatic cell cords or plates, which are arranged in an orderly manner around the major vein (Fig. 4). This arrangement is in line with findings from previous research(Zaidi, 2000; Selman, 2013; Selman, 2013). The hepatic cords are composed of a bilayer of cells, a characteristic that aligns with previous studies conducted by other researchers. These studies have also reported that the hepatocyte plates in several avian species, such as chicken, turkey, fowl, and American coot birds, exhibit a similar bilayer structure (Bach & Wood, 1990; Beresford & Henninger, 1986; Randall & Reece, 1996; Bhatnagar & Singh, 1982).

The hepatic cords are separated by blood sinusoids, small apertures that are characterised by the presence of two distinct cell types: endothelial cells, which exhibit a flattened morphology with longitudinal nuclei, and Kupffer cells, which possess circular nuclei and are of larger size (Fig. 5. a,b). These findings are consistent with the results reported by several researchers, as documented in previous studies (Ibreheem, 2008; Selman, 2013). The hepatic cells exhibit a polygonal morphology characterised by indistinct boundaries. The nuclei of these cells are spherical in shape, with a visible nucleolus positioned centrally within the cell (Fig. 5a,b). The results presented in this study align with the findings reported in previous research studies (AL-Zaidi, 2000; Selman, 2013).

The portal region of the liver comprises lymphatic vessel branches, bile duct branches, portal vein branches, and portal artery branches. The hepatic artery contains an internal elastic membrane, the bile duct is bordered by a layer of simple cuboidal epithelial tissue, and the portal vein is coated by endothelial cells accompanied by smooth muscle fibres (Fig. 6). The results presented in this study

align with the conclusions reported in other prior investigations (Abdali & Ghyadh 2016; Bach & Wood 1990).

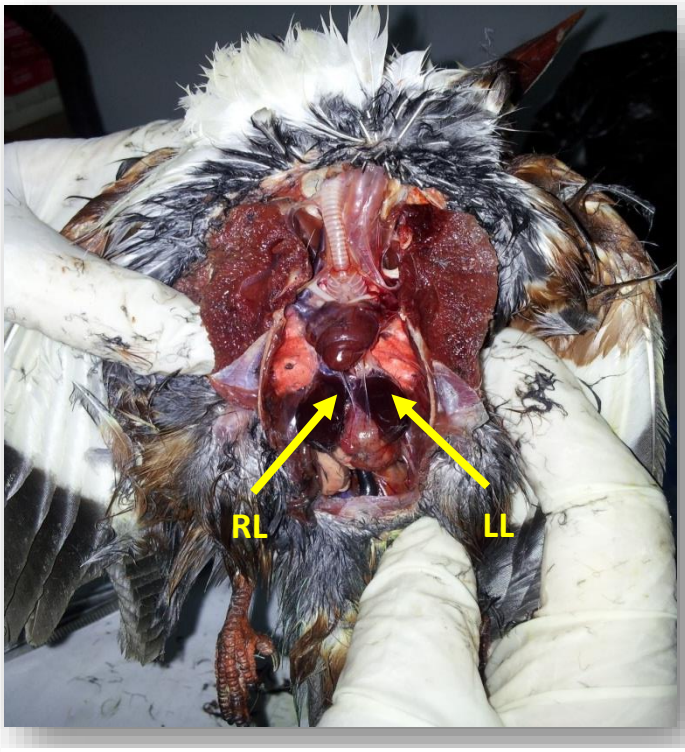

Figure 1. Liver of *Halcyon smyrnensis* (white-breasted kingfisher) displaying RL, right lobe, LL, left lobe

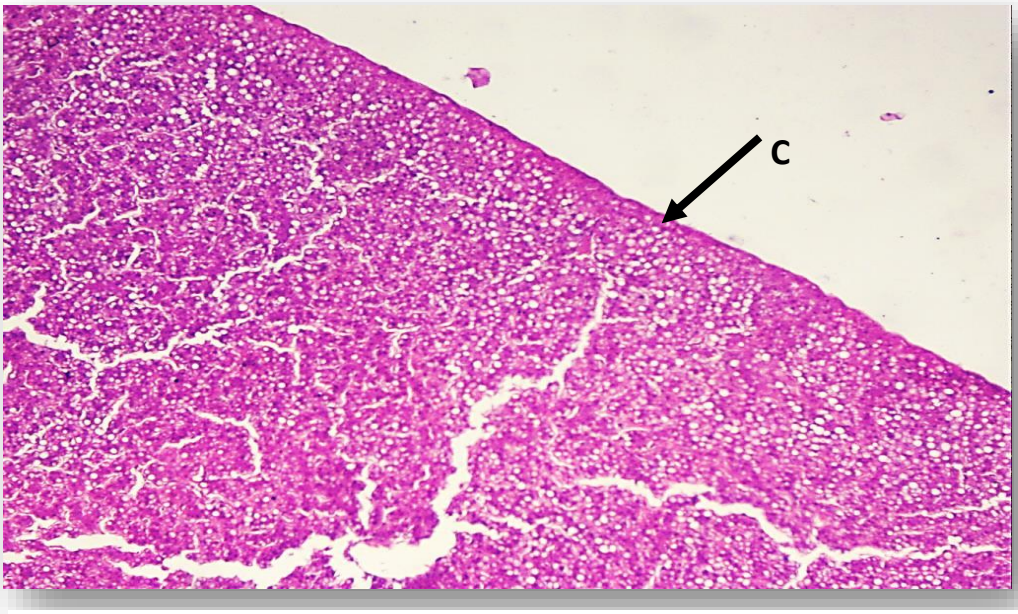

Figure 2. Cross section of liver in (white-breasted kingfisher) *Halcyon Smyrnensis* C – Capsule (100×)

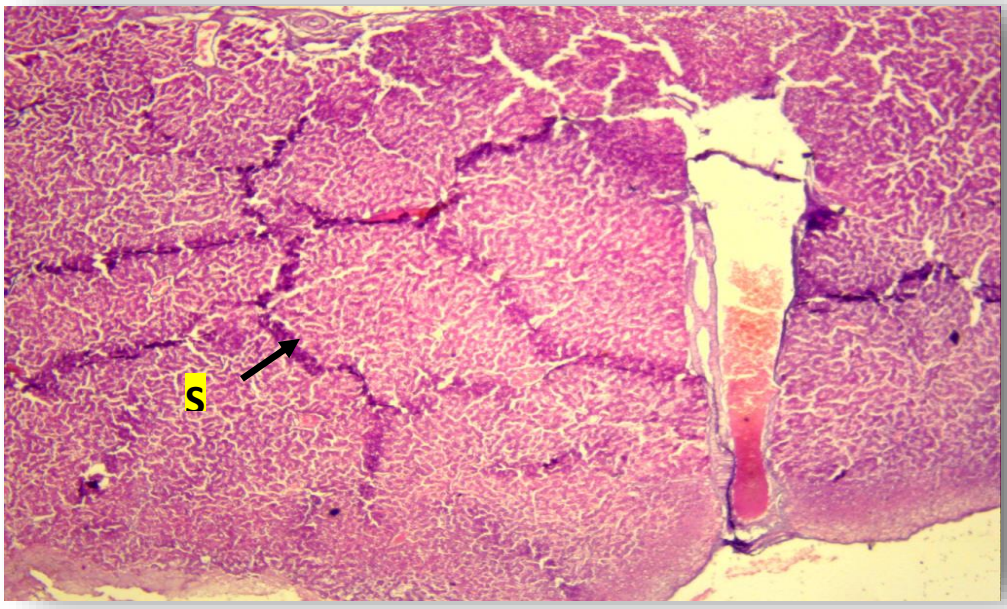

Figure 3. Lobule in the liver of (white-breasted Kingfisher) *Halcyon Smyrnensis* S-Septa ((40×)

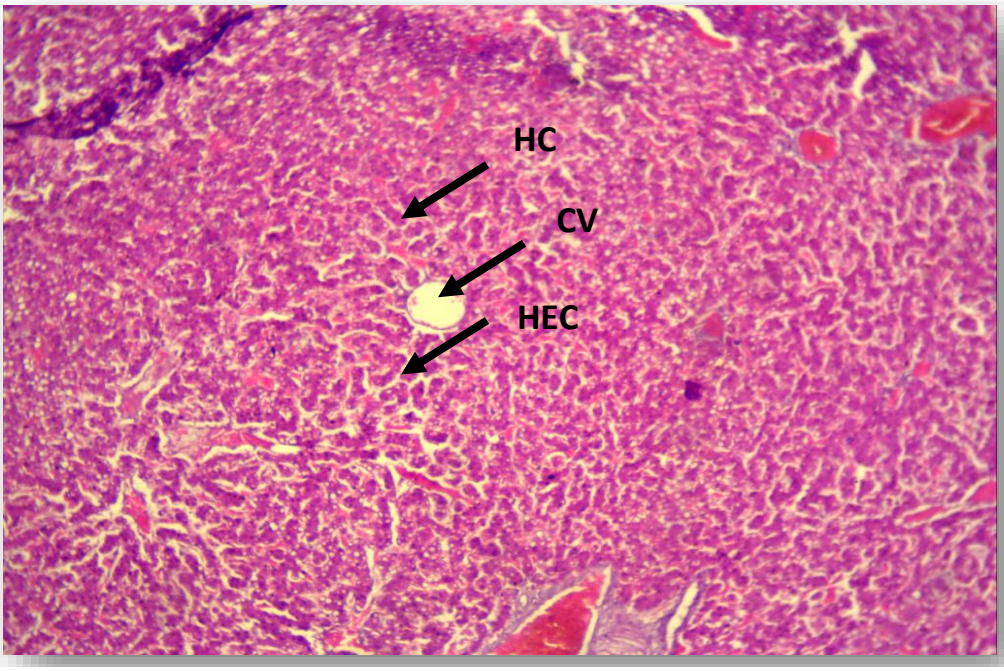

Figure 4. Hepatic cross-section in *Halcyon Smyrnensis* (white-breasted kingfisher); CV stands for central vein; HEC for hepatic cord; and HC for hepatic cell (100×)

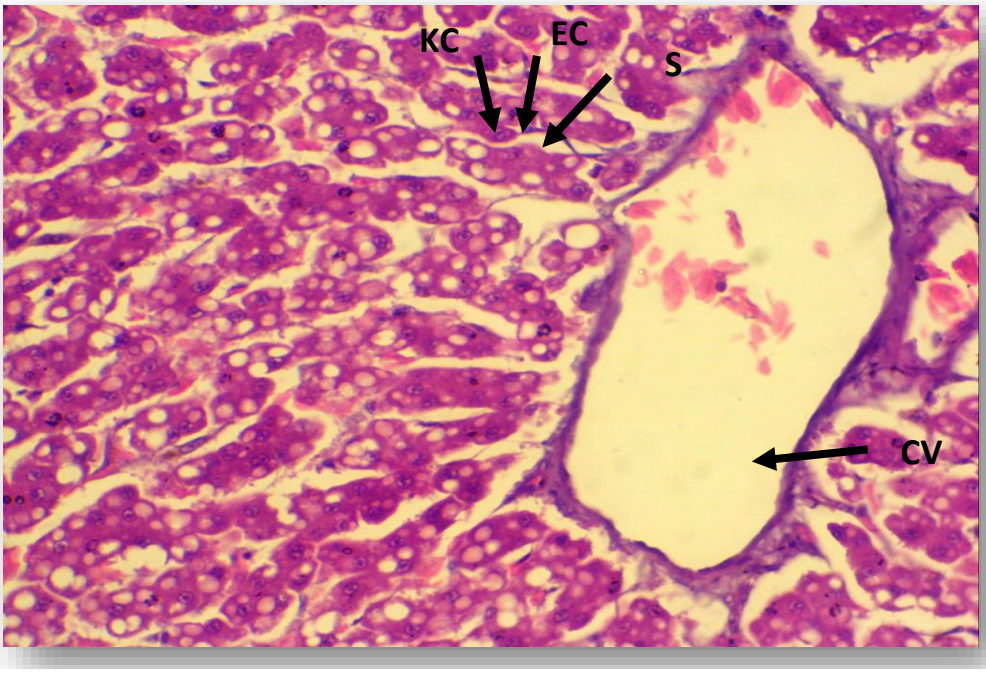

Figure (5,a). Cross section of the liver of a white-breasted kingfisher (*Halcyon Smyrnensis)* CV- Central vein, EC-Endothelial cell, S Sinosuids, and KC (Kupffer cell; 400 ×)

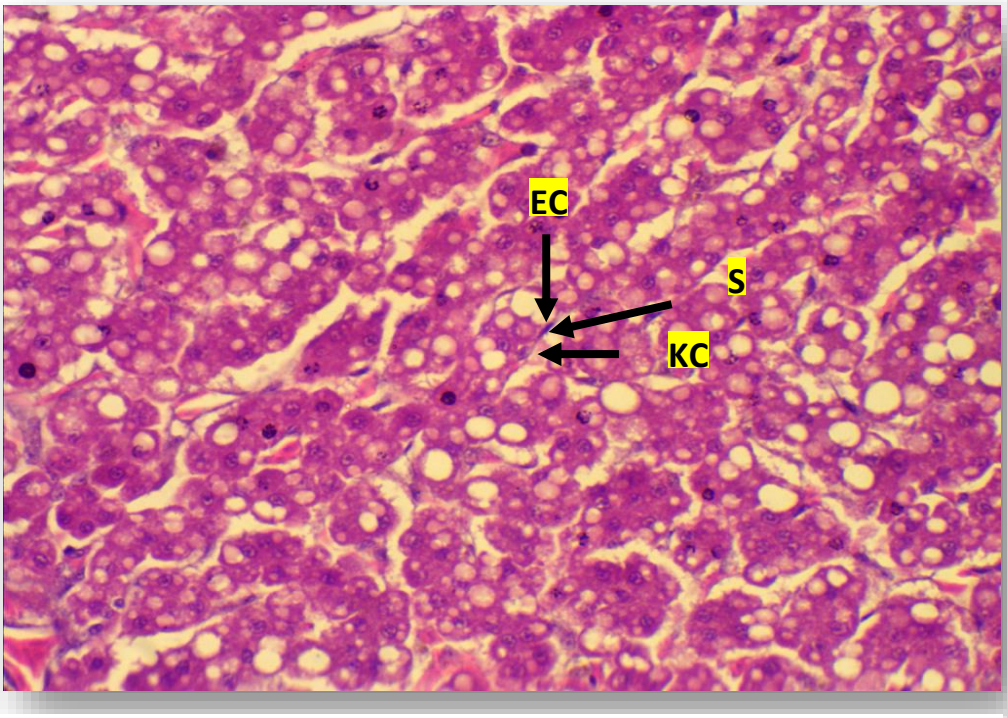

Figure (5,b). Cross section of the liver of the white breasted king fisher (Halcyon symrnensis) S-sinusoid, EC (endothelial cell), KC (kupffer cell), (400×)

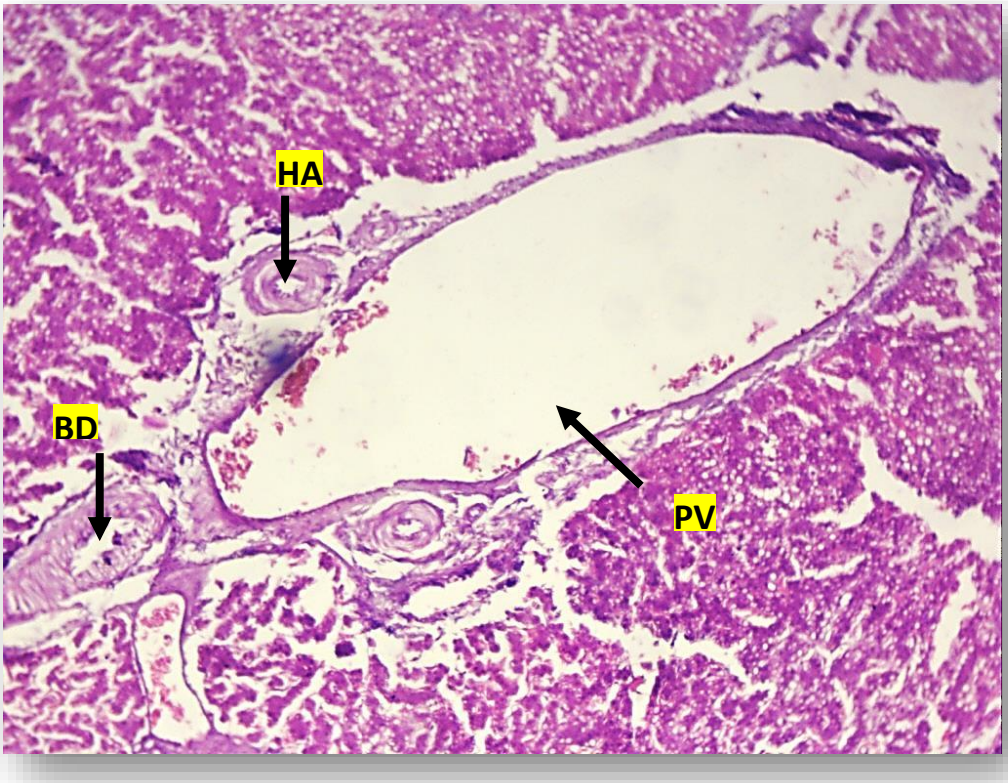

Figure 6. portal region of the liver in *Halcyon Smyrnensis* (white-breasted kingfisher) Hepatic artery (HA), bile duct (BD), (PV) Portal vein (100×).

Conclusions

The liver in this bird is similar to the liver in other birds from a morphological standpoint, taking into account the difference in the size and color of the lobes, as well as the case in terms of its tissue structure.

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