



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating 2017: 5.03
TPI 2017; 6(5): 25-28
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www.thepharmajournal.com
Received: 13-03-2017
Accepted: 14-04-2017

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Histochemical studies of Proventriculus and Gizzard of Kadaknath Fowl

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Abstract

The study was conducted to evaluate the histochemical characteristics of proventriculus and gizzard on 12 Kadaknath breed of fowl comprising of 0 day and 112 days old (adult) respectively. The present study revealed that the proventricular surface epithelium cells were showing positive activity for both acid and neutral mucin particularly at the supranuclear portion. The activity of mucin was higher in the 112 days old birds compare to the 0 days old birds. The surface epithelium of gizzard was positive neutral mucin. The PAS activity was mainly seen at the tip of the mucosal folds and the activity was diminished towards the base of the mucosal folds of proventriculus. Gizzard showed negative results for acid mucin. Proventricular mucosal epithelium was showing moderately positive activity for Glucose-6-phosphatase and strong positive activity for ATPase, AKPase, and ACPase. Proventricular glands were also showing positive activity for ATPase, ACPase and AKPase whereas gizzard showed weak activity at the surface epithelium for ATPase and glucose-6-phosphatase.

Keywords: Histochemistry, Kadaknath, proventriculus and gizzard

1. Introduction

Materials and Methods

The present study was conducted on 12 birds of Kadaknath breed of fowl in the Department of Veterinary Anatomy, College of Veterinary & Animal Sciences, G. B. Pant University of Agriculture & Technology, Pantnagar. The birds were procured from from Instructional Poultry Farm, G.B. Pant University of Agriculture and Technology, Pantnagar. Based on age, the birds were divided into 2 groups with 6 birds in each age group comprising of 0 day and 112-days old. For histoenzymic study, proventriculus and gizzard sample immediately after collecting were fixed in liquid nitrogen. 10 μ thick sections were obtained in cryostat (Leica, Germany) at -20°C. Frozen sections were used for localization of Alkaline phosphatase, Acid phosphatase, Glucose -6-phosphatase, Adenosine Triphosphatase. For detecting the presence of acid and neutral mucin tissue samples were fixed in 10% neutral buffered formalin and processed for routine paraffin embedding and sections of 5-6 μ thickness were cut. The sections were then subjected to PAS technique for Carbohydrates and Alcian blue for Mucosubstances (Luna, 1968) [6].

Results and Discussion

Proventriculus

In both the age groups of birds the epithelial cells of tunica mucosa were showing strongly positive reaction to PAS. The apical portion of the cells was showing strong reaction, indicating the presence of mucous secretory granules at the supranuclear portion of the cells (Fig.1). The intensities of the reaction was higher at the superficial epithelium compare to the epithelium towards the base of the mucosal folds (Fig. 1). Which are in accordance with the findings of Hodges (1974) [5] and Shyla *et al.*, (1992) [15]. Whereas Pastor *et al.* (1988) [11] reported that the surface epithelium of the proventriculus shows a negative reaction for both the acid and neutral mucin in parrots. Positive reaction was observed in both the age groups of birds for Alcian blue staining at the supranuclear portion. Intensities of reaction was more at the tip of the mucosal folds compare to the cells located at the base (Fig.3). In both PAS and Alcian blue staining reaction intensity was higher in 112 days old compare to 0 day old. These findings were in support with the findings of Selvan S P and Ushakumary 2008 [14].

In both the age groups of birds moderate activity of glucose-6-phosphatase was noticed in the apical portion of the epithelial cells (Fig. 4, 5). These findings were in accordance with the findings of Bhattacharaya *et al.*, 1994 [2] and Salem *et al.*, 1992 [13]. Positive activity for

ATPase was noticed in the apical portion of the mucosal epithelium cells. Glandular epithelium was also showing positive reaction to ATPase (Fig. 6, 7). Which are in accordance to the findings of Salem *et al.*, 1992^[13] and Bhattacharya *et al.*, 1994^[2]. A strong positive reaction was observed, particularly the surface epithelium and the glandular epithelium to Alkaline Phosphatase (Fig.8, 9). Similar observations were also recorded by Bhattacharya *et al.*, 1994^[2]. Strong Acid Phosphatase activity was seen in surface epithelium and the glandular epithelium (Fig.10, 11). Similar findings had also reported by Bhattacharaya *et al.*, 1994 and Selvan, S.P And Ushakumary 2008^[2, 14].

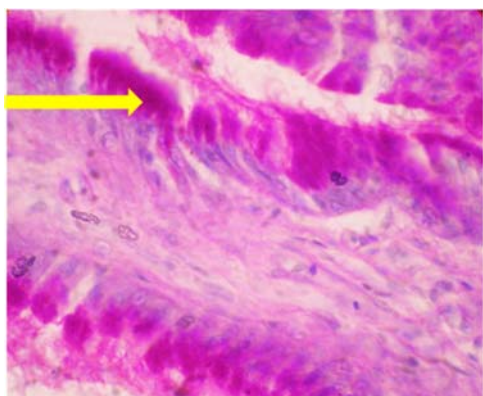


Fig 1: Photomicrograph of proventriculus of 112 day old Kadaknath fowl showing PAS activity (→) of the mucosal epithelium (PAS stain X1000)

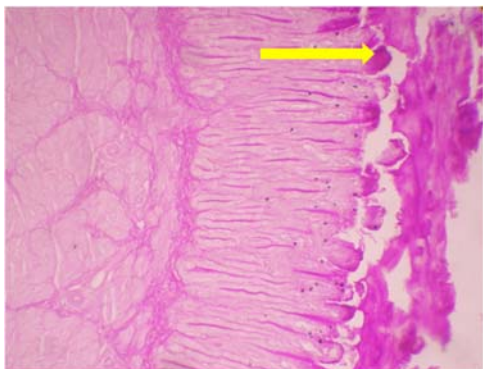


Fig 2: Photomicrograph of gizzard of 0day old Kadaknath fowl showing PAS activity (→) of the mucosal epithelium and glandular secretion (PAS stain X200)

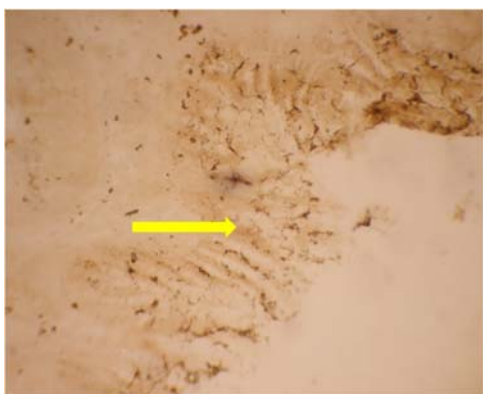


Fig 3: Photomicrograph of proventriculus of 28 day old Kadaknath fowl showing Alcian blue reaction (→) of the mucosal epithelium (Alcian Blue stain X200)

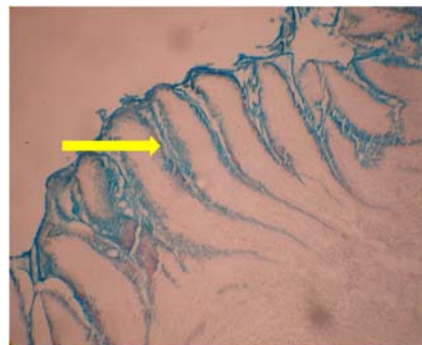


Fig 4: Photomicrograph of proventriculus of 0day old Kadaknath fowl showing glucose-6-phosphatase activity of the mucosal epithelium (Glucose-6-phosphatase X100)

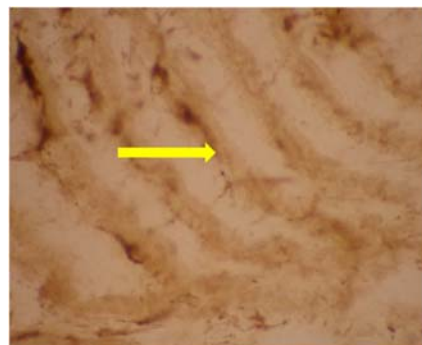


Fig 5: Photomicrograph of proventriculus of 112day old Kadaknath fowl showing glucose-6-phosphatase activity (→) of the mucosal epithelium (Glucose-6-phosphatase X400)

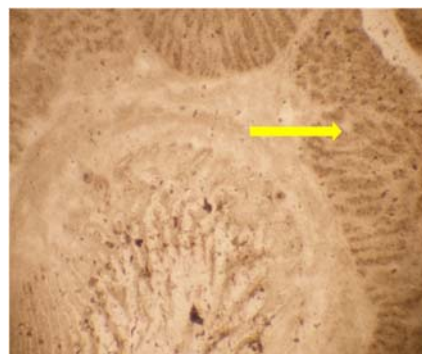


Fig 6: Photomicrograph of proventriculus of 0day old Kadaknath fowl showing ATPase activity (→) of the mucosal epithelium and proventricular glands (Adenosine-tri-phosphatase X100)

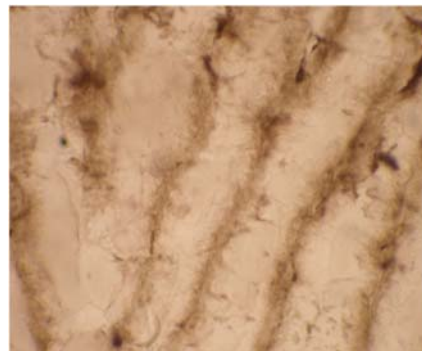


Fig 7: Photomicrograph of proventriculus of 112days old Kadaknath fowl showing ATPase activity (→) of the mucosal epithelium (Adenosine-tri-phosphatase X400)

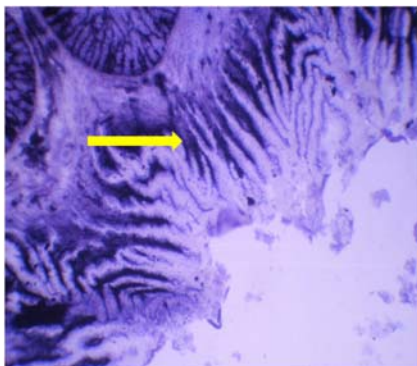


Fig 8: Photomicrograph of proventriculus of 0 days old Kadaknath fowl showing AKPase activity (→) of the mucosal epithelium (Alkaline phosphatase X200)

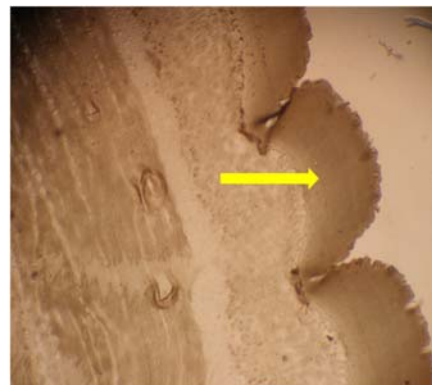


Fig 12: Photomicrograph of Gizzard of 112 days old Kadaknath fowl showing ATPase activity of the mucosal epithelium (ATPase X200)

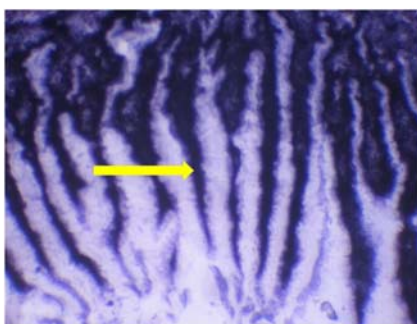


Fig 9: Photomicrograph of proventriculus of 112 days old Kadaknath fowl showing AKPase activity (→) of the mucosal epithelium (Alkaline phosphatase X200)

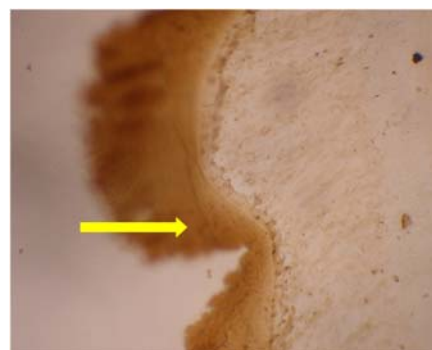


Fig 13: Photomicrograph of Gizzard of 112 days old Kadaknath fowl showing Glucose-6-Phosphatase activity of the mucosal epithelium (Glucose-6-phosphatase X200)

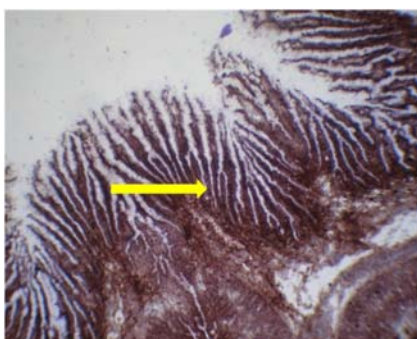


Fig 10: Photomicrograph of proventriculus of 0 days old Kadaknath fowl showing ACPase activity (→) of the mucosal epithelium (Acid phosphatase X100)

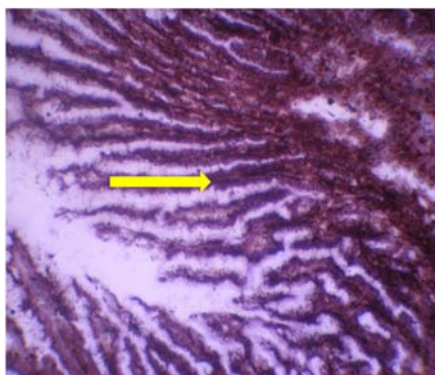


Fig 11: Photomicrograph of proventriculus of 112 days old Kadaknath fowl showing ACPase activity of the mucosal epithelium (Acid phosphatase X200)

Gizzard

Inner cornified layer showed a positive reaction to PAS in both age groups of birds also recorded by Eglitis and Knouff (1962)^[4]

The tunica mucosa were showing moderately positive reaction to the PAS staining. The reaction intensity gradually diminished towards the base of tunica mucosa. Glandular secretion was showing positive reaction which were found in between the mucosal folds. Reaction intensity was mainly observed at the tip of the folds (Fig. 2). Selvan, S.P And Ushakumary 2008^[14] and Sukanuma *et al.*, 1981^[17] It was found that both the age groups of birds were showing a negative result to the alcian blue staining which is in accordance with the findings of Prasad and Kakade (1990)^[12] in duck. Both the age groups of birds were showing negative reaction to Alkaline phosphatase and Acid phosphatase. A weak positive activity was observed in the mucosa for the Glucose -6-phosphatase, Adenosine Triphosphatase. Selvan, S.P And Ushakumary 2008^[14] in guinea fowl reported that gizzard showed negative activity for Alkaline phosphatase and Acid phosphatase. But Mohan *et al.*, 1977^[8, 9] reported that the surface epithelium of gizzard was positive for acid phosphatase and alkaline phosphatase in parrots.

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