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Comparative studies on urinary system of Aseel and Rhode Island Red (RIR) breeds of poultry

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Abstract

The present comparative study was conducted to evaluate the urinary system of Aseel and Rhode Island Red (RIR) breeds of poultry and experiments was done on 24 apparently healthy birds of Aseel and RIR breeds of poultry which were divided into grower and adult groups. Each kidney was divided into cranial, middle and caudal divisions by the grooves present on the ventral surface. In RIR grower as well as in adults, weight, volume and maximum width of kidney to body weight was more in RIR grower than Aseel. While, in adult birds it was more in Aseel than RIR. The ureter had two parts, renal and pelvic. Highly significant difference was observed in the weight, length and volume of both the ureters of an RIR grower than Aseel.

Keywords: Aseel, RIR, Gross morphology, Urinary system

Introduction

Avian urinary system has consisted of the kidney and ureter only. Kidneys play an important role in maintaining homeostasis. The ureter is an important organ, which carries urine to the cloaca. There was no literature available on the gross studies of the urinary system of this breed. The present work was undertaken to study the comparative gross morphology of the urinary system of Aseel and RIR breeds of poultry.

Materials and Methods

The experiment was done on 24 apparently healthy birds of 2 groups of RIR and Aseel breeds of poultry irrespective of sex. The birds were divided into grower and adult (group I and II) respectively. Both the groups had 12 birds, 6 birds of each breed. After taking the body weight, birds of the specified age group were sacrificed by cutting jugular vein and common carotid artery. Kidney and ureter were collected and their length and width were recorded by using Vernier caliper, weight was taken with the help of electronic monopan balance whereas, volume was taken with the help of the water displacement method. The data were statistically analyzed by using analysis of independent mean "T" test as per Snedecor and Cochran (1994) [2].

Results and Discussion

Kidney: The colour of the kidneys was reddish brown. The right and left kidneys were retroperitoneal and present symmetrically in a depression on ventral surface of synsacrum and renal fossa of ilium. Depression on the synsacrum was extended upto the distal third. The cranial margin of each kidney was extended immediately caudal to the lungs between the sixth and seventh thoracic vertebrae. These extended upto the rostral third of gizzard in grower birds while, in adult birds upto the distal third of gizzard. On the surface of the kidney small projections were seen in all three divisions. This might be the external surface of the renal lobule.

The dorsal surface of the kidney had the impression of lumbosacral mass, which extended from the medial border to the middle of the kidney. The impressions were shallow in grower birds that an adult bird in both breeds. Each kidney was divided into cranial, middle and caudal divisions by the grooves present on the ventral surface. The groove was shallow and directed caudo-laterally from median plane. However, (Nubipour *et al.* 2009) [1] stated that the groove was transverse. External iliac artery was present in the groove between the cranial and middle division. Groove containing ischiatic artery separated the middle and caudal division of the kidney.

In both breeds and age groups, the shape of the kidney was similar. The cranial division was oval elongated, middle division was slender and caudal division was irregular.

Kidneys were related middlaly to the aorta and caudal venacava. Cranial division and rostral third of middle division were related ventrally to the dorsal surface of testicles in male were as ovary in the female. Ventrally the middle and caudal part of middle division and caudal division were related to loops of intestine, liver, gizzard, pancreas, ureter, and ovi duct in female and vas deference in male. Length of both the kidneys is greater in RIR grower and the adult bird than Aseel bird. In RIR grower, the length of the left kidney was significant while in RIR adult, the length of both kidneys was highly significant.

Weight of both kidneys of RIR grower where highly significant than Aseel grower. While in adult bird, only the weight of the right kidney was highly significant. The percentage contribution of weight of kidney to body weight was more in the RIR grower breed than Aseel breed. While in adult bird, the percentage contribution of weight of kidney to body weight was more in Aseel breed than RIR breed. This was indicative of higher growth rates in the RIR bird during later stages. The highly significant distance was recorded in the volume of kidneys in RIR and Aseel bird in both age

groups in RIR grower, the maximum width of the right as well as left kidney was highly significant than Aseel grower. While in adult bird, only the maximum width of left kidney was highly significant in the RIR breed than Aseel.

The weight of the cranial division of the both kidneys of RIR grower and adult bird was highly significant than Aseel. In RIR adult the length of cranial division of the kidney was highly significant in RIR grower. While in adult birds, a highly significant difference was recorded in left kidney in RIR bird. In RIR grower and adult bird the volume of the cranial division of the kidney was highly significant than Aseel bird.

The recorded weight, length, width and volume of the middle and caudal division of both kidneys were highly significant in RIR grower than Aseel grower the weight and volume of the caudal division of both kidneys were highly significant in adult RIR than Aseel. The length of the caudal division of right and left kidney was highly significant, respectively in RIR adult than Aseel adult bird. The width of the caudal division of left kidney of RIR adult was more significant than Aseel birds.

Table 1: Gross morphometrical observations of kidneys in birds

Parameters	Group-I				Group-II			
	Aseel		RIR		Aseel		RIR	
Kidney	Right	Left	Right	Left	Right	Left	Right	Left
Weight	2.85±0.10	3.22±0.08	5.32±0.16**	4.92±0.15**	4.43±0.16	5.13±0.16	7.83±0.49**	7.73±0.19
Length	5.26±0.06	5.23±0.08	6.88±0.05	6.48±0.10**	6.12±0.16	6.43±0.16	8.28±0.31**	7.38±0.19**
Volume	3.12±0.25	3.12±0.12	6.25±0.16**	6.98±3.5**	4.32±0.28	5.45±0.29	10.26±0.73**	9.40±0.56**
Width Maximum	1.05±0.04	0.90±0.04	1.32±0.01**	1.29±0.02**	1.16±0.04	1.06±0.04	1.25±0.08	1.32±0.02**
Width Minimum	1.47±0.85	0.58±0.02	0.62±0.02	0.53±0.02	0.54±0.04	0.56±0.04	0.92±0.20	0.70±0.02
Cranial Wt (gm)	1.05±0.03	1.13±0.04	1.68±0.03**	1.93±0.07**	1.35±0.04	1.36±0.04	2.89±0.06**	2.78±0.16**
Length (cm)	1.87±0.02	2.01±0.02	2.28±0.16	2.01±0.01	1.86±0.04	1.96±0.04	2.83±0.22**	2.76±0.16**
Width(cm)	0.84±0.03	0.70±0.02	1.32±0.02**	1.12±0.01**	1.16±0.04	0.96±0.04	1.38±0.12	1.26±0.02**
Volume(mm ³)	1.26±0.16	1.12±0.12	2.83±0.12**	2.82±0.12**	1.12±0.06	1.55±0.06	4.18±0.28**	3.68±0.06*
Middle wt (gm)	0.82±0.05	0.92±0.03	1.29±0.03**	1.28±0.04**	1.98±0.04	2.35±0.06	2.52±0.06**	2.23±0.06
Length (cm)	1.8±0.02	1.72±0.12	2.55±0.20**	2.14±0.02**	2.35±0.04	2.45±0.06	2.58±0.16	2.39±0.12
Width(cm)	0.71±0.02	0.66±0.01	1.23±0.01**	0.92±0.02**	0.75±0.04	1.06±0.04	1.10±0.04**	1.02±0.04
Volume(mm ³)	0.94±0.06	1.12±0.01	1.40±0.18*	2.11±0.01**	1.88±0.12	2.26±0.10	2.83±0.12**	2.68±0.26
Caudal wt. (cm)	0.96±0.01	1.06±0.02	2.10±0.06**	1.72±0.06**	1.22±0.02	1.42±0.06	2.82±0.12**	2.65±0.08**
Length(cm)	1.42±0.03	1.59±0.10	2.03±0.03**	3.35±0.06**	1.78±0.04	1.86±0.06	2.82±0.14**	2.20±0.08*
Width(cm)	1.05±0.04	0.89±0.03	1.19±0.02**	1.28±0.03**	1.16±0.04	1.06±0.04	1.30±0.08	1.30±0.04*
Volume(mm ³)	0.93±0.06	1.02±0.01	2.02±0.01**	2.12±0.22**	1.19±0.08	1.64±0.16	3.38±0.35**	2.96±0.01**

Mean value with (*) superscripts shows significant differences (P<0.05)

Mean value with (**) superscripts shows significant differences (P<0.01)

Ureter: The ureter exhibited two parts, renal and pelvic. The renal part of ureter began from the ventro-medial border of the rostral third of the cranial division of the kidney and caudally in the groove on the middle and caudal divisions of kidney, lateral to vas deferens in male and oviduct in females. At the level of caudal extremity of the caudal division of kidney, the renal part of ureter cross the ductus deferens in the male and oviduct in female and entered in pelvic course. The pelvic division of ureter passed along with the dorsal wall of the abdomen and terminated in the urodeum of cloaca. The opening of the ureter was present medial to that of vas deferens and oviduct in male and female respectively. Highly significant differences was observed in the weight, length and volume of both the ureters of an RIR grower than Aseel the length and volume of both the ureters were highly significant in RIR adult than Aseel. While, the weight was highly significant only for left ureter. The percentage contribution of weight of both the ureter to the body was more in the RIR grower breed than Aseel, whereas, in adult bird it was greater in Aseel than RIR.

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