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Revision of common snipe, *Gallinago gallinago* in morphometric analysis and building the standard reference haematological values for further studies

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Abstract: This study was designed to record some morphometric and haematological parameters of common snipe, *Gallinago gallinago*. For this purpose, 20 individuals (10 male, 10 female) were collected from the wetlands of District Bahawalnagar, Punjab, Pakistan. Significant differences between the sexes were recorded in tail length, length of longest primary feather, and chest circumference. . No significant difference was recorded in haematological parameters between the sexes. Gut analysis revealed that common snipe feed mostly on Chironomidae and Ceratopogonidae larvae and male and female snipes have the same food preference.

Key words: Morphometry, haematology, food preference, common snipe, Pakistan

1. Introduction

The common snipe (*Gallinago gallinago*) is a small to medium-sized, well-camouflaged wader that belongs to the family Scolopacidae. The generic name is derived from the Latin word '*gallina*' meaning 'hen' and '*ago*' meaning 'resembling/similar to' (Jobling, 2010). This bird is a resident wader of England and Iceland but found all over Europe with a range extending from southern Asia to Central Africa.[1] It is a winter migrant to widespread areas of riversides in Pakistan (Grimmett et al., 2008; Roberts, 1991).

Common snipe is nocturnal or crepuscular in its feeding activity. It feeds mainly on aquatic insects, annelid worms, larvae of Tipulidae and Elateridae family. Moreover, birds often catch geometrid moth caterpillars, *Planorbis* snails and only occasionally water shrimps, seeds (leguminous), weeds, and sedges (Roberts, 1991).

Morphometric data is useful in studying sex differences, geographic variation within species, growth, and classification of birds (Töpfer, 2018). Morphometric measurements vary greatly due to the age, species, and sex of the bird. In addition, variation in body size is also related to habitat, e.g., differences in wing length could be related to habitat type (Telleria and Carlionell, 1999). It is also important in strategies adopted for migration (Marchetti et al., 1995), sexual selection (Hedenström and Møller, 1992), and antipredator tactics (Alatalo et al., 1984).

Haematological studies are important for evaluating the health status of birds. Haematological parameters of a bird are affected by a number of factors such as age, time of day, sex, reproduction status, geographical location, and population (Clark et al., 2009). As we need a reference value for most of the haemotological studies, this study will help in building a standard reference value for future studies.

2. Materials and Methods

2.1. Sampling

Samples of common snipe (10 male and 10 female) were captured using nets by the help of local hunters from the wetlands of District Bahawalnagar then the birds were anaesthetized with the help of diazepam (0.2 mg/kg) and ketamine HCL (10 mg/kg). The average temperature of Bahawalnagar during the study period was 25.55 ± 3.53 °C with rainfall of 6.25 ± 3.49 cm. Sampling was conducted from December 2018 (winter) to March 2019.

2.2. Mensural study

Collected anaesthetized individuals were subjected to some mensural measurements in the field. Body weight was taken using an electronic balance (minimum 0.001 g). Body length, wingspan, wing length, length of the longest primary feather, tail length, tarsus, central toe length, beak length, head length without beak and head length with

[1] BirdLife International (2019). *Gallinago gallinago* (amended version of 2017 assessment). The IUCN Red List of Threatened Species 2019: e.T22693097A155504420 [online]. Website https://www.iucnredlist.org/species/22693097/155504420#amendment [accessed 00 Month Year].

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beak were measured according to Eck et al. (2012). Chest circumference was measured according to Semakula et al. (2011). The sex of birds was assessed by dissecting the birds after taking body measurements and blood sample.

2.3. Blood sample analysis

Blood samples of anesthesized birds were collected from the jugular vein puncture using disposable syringes. EDTA tubes were used for collecting the blood samples (10 female samples, 10 male samples), and about 5 µL blood was drawn from each bird.

The collected blood was analyzed for haemoglobin level, white blood cells (WBCs) counts, total red blood cells (RBCs) counts, hematocrit (HCT), platelets counts, red cells distribution width (RDW), and mean platelet volume (MPV) using an automatic haematological analyzer (XP-100 Sysmex, Kobe, Japan). Mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) were recorded from erythrocytes series values (Sripada et al., 2014).

2.4. Food preferences

After morphometric measurements and taking blood samples, the birds were dissected to remove the gastrointestinal tract and find the sex of each bird. Each gastrointestinal tract was packed separately in polythene bags, labeled (field no., date and sex), placed in the icebox, and transported to the laboratory. Each stomach was dissected to remove the contents, washed by standard process testing sieves. Gut contents were identified with a dissecting microscope (IRMECO model SESYG306; 60X). Gut content was separated and identified using available descriptions and diagrams of seeds (Martin and

Table 1. Comparison of morphometric characteristics between male and female of the common snipe collected from Wetlands of District Bahawalnagar, Punjab, Pakistan.

Characters	Sex (n = 10 each)	SE	Mean	Range	p-value
Body weight (g)	Male	2.19	98.69	89.9–112.6	0.9534^{NS}
	Female	1.62	98.52	90.6–110.9	
Body length (cm)	Male	0.33	27.10	25.4–29.1	0.1555^{NS}
	Female	0.20	26.50	25.4–27.5	
Tail length (cm)	Male	0.15	6.15	5.6–7.1	0.0091**
	Female	0.09	6.68	6.1–7.0	
Wingspan (cm)	Male	0.89	41.58	37.5–48.7	0.9718^{NS}
	Female	0.34	41.62	38.9–43.1	
Wing length (cm)	Male	0.21	18.72	17.5–19.9	0.7883^{NS}
	Female	0.17	18.80	17.5–19.7	
Longest primary feather (cm)	Male	0.15	13.18	12.3–14.0	0.0375*
	Female	0.06	13.58	13.2–13.8	
Tarsus (cm)	Male	0.10	3.40	2.7–3.8	0.6163^{NS}
	Female	0.06	3.46	3.2–3.76	
Central toe length (cm)	Male	0.08	4.06	3.6–4.5	0.2869^{NS}
	Female	0.08	3.93	3.4–4.5	
Head length without bill (cm)	Male	0.13	2.80	2.4–3.8	0.2132^{NS}
	Female	0.13	2.56	2.1–3.4	
Head length with bill (cm)	Male	0.22	9.57	8.7–11.0	0.2792^{NS}
	Female	0.21	9.29	8.5–10.1	
Bill length (cm)	Male	0.09	6.770	6.3–7.2	0.8000^{NS}
	Female	0.08	6.737	6.1–7.0	
Chest circumference (cm)	Male	0.14	16.17	15.3–16.8	0.0259*
	Female	0.09	15.75	15.4–16.4	

SE = Standard error.

Table 2. Haematological parameters of Common snipe from Wetlands of District Bahawalnagar, Punjab, Pakistan.

Variable	Sex (n = 10 each)	SE	Mean ± SD	p-value
HGB (g/dL)	Male	0.77	22.78 ± 1.34	0.42^{NS}
	Female	0.84	24.05 ± 1.46	
WBC ($\times10^3/\mu L$)	Male	1.28	406.73 ± 2.21	0.50^{NS}
	Female	1.96	408.87 ± 3.40	
RBC ($\times10^6/\mu L$)	Male	0.06	4.19 ± 0.11	0.56^{NS}
	Female	0.23	4.38 ± 0.39	
HCT (%)	Male	0.83	67.73 ± 1.44	0.81^{NS}
	Female	1.25	68.20 ± 2.16	
MCV (FL)	Male	0.85	161.10 ± 1.48	0.72^{NS}
	Female	1.47	161.89 ± 2.55	
MCH (pg)	Male	0.98	54.67 ± 1.70	0.66^{NS}
	Female	1.93	58.68 ± 3.34	
MCHC (g/dL)	Male	0.58	33.87 ± 1.00	0.20^{NS}
	Female	1.70	34.92 ± 2.95	
PLT ($\times10^3/\mu L$)	Male	0.82	3 ± 1.41	0.64^{NS}
	Female	0.72	3.67 ± 1.25	
RDW	Male	0.62	44.90 ± 1.07	0.56^{NS}
	Female	0.97	44.00 ± 1.69	
MPV (fL)	Male	0.78	10.23 ± 1.36	0.25^{NS}
	Female	0.65	11.93 ± 1.12	
Neutrophils	Male	0.72	85.33 ± 1.25	0.75^{NS}
	Female	1.41	86 ± 2.45	
Lymphocytes	Male	0.54	10.67 ± 0.94	0.45^{NS}
	Female	1.19	9.33 ± 2.05	
Monocytes	Male	0.54	2.67 ± 0.94	$>0.99^{NS}$
	Female	0.27	2.67 ± 0.47	
Eosinophils	Male	0.27	1.33 ± 0.47	0.37^{NS}
	Female	0.47	2 ± 0.82	

NS = Nonsignificant ($p > 0.05$); SD = Standard deviation; SE = Standard error.

Barkley, 1961); and taxonomic key for animals (Crow and Hellquist, 2000). Insects were identified at the lowest level possible using Chu and Cutkomp (1949).

2.5. Statistical analysis

The data was described through a standard statistical method (mean, standard error, and range) using IBM SPSS Statistics V21.0 (IBM Corporation, Armonk, NY, USA). The significance of the difference was tested using an unpaired t-test at 0.05 levels.

3. Results

Overall data for different morphometric measurements is represented in Table 1. Except for tail length, length of longest primary feather, and chest circumference, no significant differences were observed in the majority of the morphometric measurements (Figure).

Moreover, no significant difference was recorded in blood parameters between the sexes (Table 2).

The gut contents consisted of larvae from the Chironomidae and Ceratopogonidae family. The insects were from the order Coleoptera, Hemiptera, and Odonata and the family Haliplidae. Some plant material and snails were also recorded in the guts. There was no significant difference in the mean weight of gut, empty gut, and mean weight of gut between male and female common snipe (Table 3).

There were no significant differences between males and females in their gut content, but males had insects

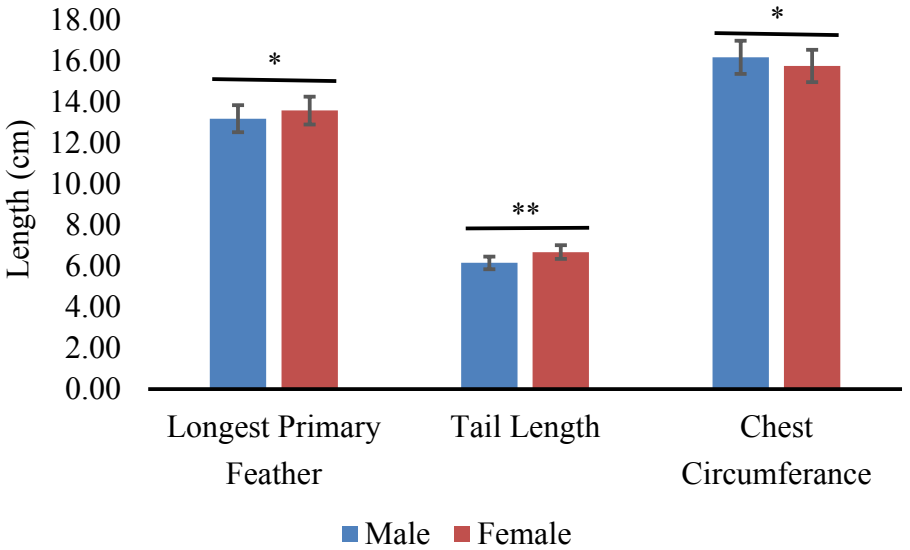

Figure. Comparison of longest primary feather, tail length, and chest circumference in male and female common snipe (* = p <0 .05; **= p < 0.01).

Table 3. Weight of gut variables in male and female common snipe.

Characters	Sex	*N*	Mean	SD	SE	t-value	p-value
Total weight of gut (g)	Male	10	2.36	0.47	0.30	–0.40	0.69^{NS}
	Female	10	2.43	0.74	0.13		
Weight of food material (g)	Male	10	0.58	0.28	0.16	–0.31	0.76^{NS}
	Female	10	0.87	0.64	0.08		
Weight of empty gut (g)	Male	10	1.78	0.31	0.26	–0.27	0.79^{NS}
	Female	10	1.56	0.39	0.07		

NS = Nonsignificant (p > 0.05); SD = Standard deviation; SE = Standard error.

of the order Hemiptera and snails in their diet while the females had Haliplidae insects and no snails or insects of the order Hemiptera (Table 4).

4. Discussion

The results showed no significant difference in body weight between male and female common snipes, which supports the findings of Ali and Ripley's study (1981). However, our outcomes contradicted with the results of Winegardner (1976) who found a significant difference between the body weight of male (108.9 ± 16.4 g) and female (92.8 ± 12.8 g) common snipe. This difference might be due to age and sample size. The body length in our study was similar to values mentioned by Roberts (1991).

There was no significant difference in wing length of both sexes (male 18.72 cm; female 18.80 cm). The values were slightly higher as compared to Włodarczyk et al.

Table 4. Gut content of male and female in the common snipe.

Type of food	Weight of different food types (%)	
	Male (n = 10)	Female (n = 10)
Chironomidae	35.86	39.67
Coleoptera	7.64	7.50
Ceratopogonidae	0.43	0.17
Stones	13.86	6.50
Digested/unindentified	40.64	42.50
Odonata	0.00	1.50
Plant material	0.93	1.83
Haliplidae	0.00	0.33
Snails	0.57	0.00
Hemiptera	0.07	0.00

(2011), who found the length of the wing in males 13.87 and 13.58 cm in females. The values of this study were also higher than Ali and Ripley (1981) who found the wing length in the range of 12.8–13.8 cm.

Bill and tarsus length of birds caught in Pakistan was similar to the values observed in other populations e.g., Włodarczyk et al. (2018), Winegardner (1976), Ali, and Ripley (1981), and Roberts (1991).

Włodarczyk et al. (2011) also recorded the head length of males is 9.59 cm and of females is 9.70 cm. Our study showed similar outcomes in the case of male snipes that had a head length (with bill) of 9.57 cm while slightly different (9.29 cm) in female snipes. Moreover, length of longest primary feather, central toe length, and body circumference were not available in the literature and are described for the first time in our study.

The concentration of haemoglobin in common snipe was 227.8 ± 13.4 g/L higher than the value recorded by Minias et al. (2014) and Minias et al. (2013) who found a value of 176.83 ± 1.41 g/L and 175.41 ± 0.80 g/L, respectively. While the remaining blood parameters are described for the first time in this study.

The major portion of the common snipe's diet consists of Diptera larvae, Chironomidae and Coleoptera. Other groups of invertebrates (e.g., Ceratopogonidae, Odonata, Haliplidae) were recorded in much smaller amountSimilar results were recorded by other authors [e.g., Soni and Javed (2019), Rundle (1982), Winegardner (1976), Boros et al. (2006), Hoodless et al. (2007)]. Moreover, plant material was present in a few samples only.

It was concluded that both sexes of common snipe are alike in both morphometric measurements (except length of longest primary feather, tail length, and chest circumference) and haematological variables. Further, the gut contents of common snipe consist of Chironomidae and Ceratopogonidae larvae as well as adult Coleoptera.

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