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RESEARCH ARTICLE

CLUTCH SIZE AND EGG CHARACTERISTICS OF COMMON BABBLER, TURDOIDES CAUDATUS CAUDATUS DUMONT IN DISTRICT JAMMU, J&K INDIA

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ARTICLE INFO	ABSTRACT

The present study on clutch size and egg characteristics of the Common Babbler, *Turdoides caudatus caudatus* (Dumont) was conducted in district Jammu (J&K) during 2010-2011. A total of 32 clutches were studied. The mean clutch size was recorded to be 3.1 ± 0.65 varying from minimum 2 to maximum 4. The most common clutch size was 3 (56.3%). Eggs were turquoise blue in colour, smooth and spotless. The average length, breadth, weight, egg volume and egg shape index of 30 eggs was found to be 22.1 ± 1.03 mm (Min. 21 mm; Max. 24 mm), 16.1 ± 0.66 mm (Min. 15 mm; Max. 18 mm), 2.5 ± 0.14 gm (Min. 2.2 gm; Max. 2.7 gm), 2.93 ± 0.30 cm^3 (Min. 2.41 cm^3; Max. 3.97 cm^3) and 72.98 (Min. 62.5; Max. 80.95) respectively. A statistically significant positive correlation was found between egg breadth and egg volume as well as between egg length and egg volume and egg breadth and egg shape index whereas a strong negative correlation was registered between egg length and egg shape index. No significant correlations were found between egg length and egg breadth as well as between egg volume and egg shape index.

INTRODUCTION

The dimensions of eggs are important life-history variables in birds as hatching mass is highly correlated with egg size for a large number of bird species (Hegyi, 1996). Generally, the breadth of an egg is determined by the anatomy of the female, the egg volume by her physiology and the egg length represents the proportion between these two traits (Van Noordwijk *et al.*, 1981). However, egg size in birds can vary with several factors including genetic component, ambient temperature, female mass and body condition, parental age, position in the laying sequence, seasonal variations, climate change and nutrient constraints (Styrsky *et al.*, 2002; Saino *et al.*, 2004; Jarvinen, 1991; Amat *et al.*, 2001; Dolenec, 2004; Hill, 1984; Jarvinen, 1994; O' Connor, 1979). The combination of egg size and clutch size determines the total energetic investment in clutch formation by a female (Flint and Sedinger, 1992) which in turn determines the breeding investment and reproductive success. The Common Babbler (*Turdoides caudatus caudatus*) is the smallest Indian member of the genus Turdoides. It is a small, slim passerine with an earthy brown plumage and a long cross barred tail. It occurs in South Asia extending from Southern Iraq patchily in Iran to Afghanistan, Pakistan, India, Nepal and Bangladesh. It is one of the commonest birds of northern India but in south it is less common (Whistler, 1949). Throughout most of its range in India it is sympatric with two other species, the Jungle Babbler (*Turdoides striatus*) and Large Grey Babbler (*Turdoides malcolmi*) (Gaston, 1978). It is generally associated with areas of low or moderate rainfall and occurs up to about 2000m in the foothills of the Himalayas (Ali and Ripley, 1971). Like many other of the genus Turdoides, these birds also form a complex and stable society and are very social even during breeding. The clutch and egg characteristics of Common Babbler were observed during a detailed study of its breeding biology in district Jammu of J&K State. In total, 20 groups were observed ranging in size from 3 to 13 individuals. The members of each group were observed to share a common foraging area, defending a common territory, also roosting and nesting together. The present document thus deals with the study of clutch size and various egg characteristics of the concerned species as well as investigating the relationship between the egg variables.

MATERIALS AND METHODS

Study Area

The study was conducted from June, 2010 to September, 2011 in district Jammu that sprawls on a hillock, on both the banks of picturesque river Tawi, a tributary of river Chenab. Nestled

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between the Himalayan foothills, the Shivalik ranges and the Indo-Gangetic plains, the Jammu constitutes the south western district of the Jammu and Kashmir state. Bounded by district Udhampur in the north and northeast, Samba district in the east and southeast, Sialkot district of Rawalpindi (Pakistan) in west and Rajouri district and parts of district Bhimber (POK) in the northwest, it covers a geographical area of 3097 sq.km. Geographically, it lies between 32º27´ and 33º30´ North latitudes and 74º19´ and 75º20´ East longitudes. Altitudinally, it extends from 275 to 410 m above the msl. Being situated in the subtropical part, the climatic conditions in and around the study area are sub-humid to arid and characterized by four well marked seasons in a year.

Table 1 Egg Characteristics of Common Babbler

Egg No.	Egg Length (mm)	Egg Breadth (mm)	Egg Weight (gm)	Egg Volume (cm³)	Egg Shape Index
1.	21	16	2.3	2.74	76.19
2.	22	16	2.7	2.87	72.73
3.	23	17	2.5	3.39	73.91
4.	22	17	2.5	3.24	77.27
5.	21	16	2.4	2.74	76.19
6.	21	16	2.6	2.74	76.19
7.	21	16	2.6	2.74	76.19
8.	21	16	2.3	2.74	76.19
9.	21	15	2.5	2.41	71.43
10.	21	16	2.6	2.74	76.19
11.	22	16	2.4	2.87	72.73
12.	21	16	2.5	2.74	76.19
13.	23	17	2.6	3.39	73.91
14.	22	16	2.6	2.87	72.73
15.	21	17	2.5	3.09	80.95
16.	21	16	2.2	2.74	76.19
17.	22	16	2.4	2.87	72.73
18.	23	16	2.5	3.0	69.57
19.	22	15	2.6	2.52	68.18
20.	22	16	2.2	2.87	72.73
21.	21	16	2.4	2.74	76.19
22.	24	15	2.5	2.75	62.50
23.	24	16	2.6	3.13	66.67
24.	23	15	2.6	2.64	65.22
25.	23	16	2.4	3.0	69.57
26.	23	16	2.3	3.0	69.57
27.	24	18	2.2	3.97	75
28.	23	16	2.5	3.0	69.57
29.	22	17	2.6	3.24	77.27
30.	23	16	2.4	3.0	69.57
Minimum	21	15	2.2	2.41	62.50
Maximum	24	18	2.7	3.97	80.95
Mean ± SD	22.1 ± 1.03	16.1 ± 0.66	2.47 ± 0.14	2.93 ± 0.03	72.98 ± 4.12

Table 2 Pearson's correlation coefficients (2-Tailed) between egg dimensions of the Common Babbler in district Jammu

Variable	Egg Breadth	Egg Volume	Egg Shape Index
Egg Length	0.137	0.571**	-0.714**
Egg Breadth	-	0.889**	0.595**
Egg Volume	-	-	0.163

Statistical significance at level p<0.01

METHODOLOGY

In present study, intensive field searches were carried out during the breeding season to locate viable nests of Common Babbler. Nests were located by following individuals carrying nesting material or food to the nests and by searching vegetation. Observations were made with the help of field binocular (Bushnell 7 X 50 U.S.A. made) or by direct visual method as required. The nests found during construction were checked daily in order to record the laying of the first egg. Regular inspections were made to the nests to determine various egg characteristics like shape, colour, length, breadth and weight. The length and breadth of eggs were measured with Vernier calliper. Eggs were weighed to the nearest 0.01 gm with the help of an electronic weighing machine. Unless otherwise mentioned, all egg lengths and breadths are expressed in mm. The clutch size was recorded after laying was completed. Egg volume (V) was computed from the length (L) and breadth (B) of each egg, using the formula developed by Hoyt (1979) as follows: $V = 0.51 \times L \times B^2$. Egg shape index (ES) was calculated using the formula as follows: $ES = B/L \times 100$. Correlation between dimensions of eggs was analysed with Pearson's correlation. The statistical analyses were performed using SPSS 20
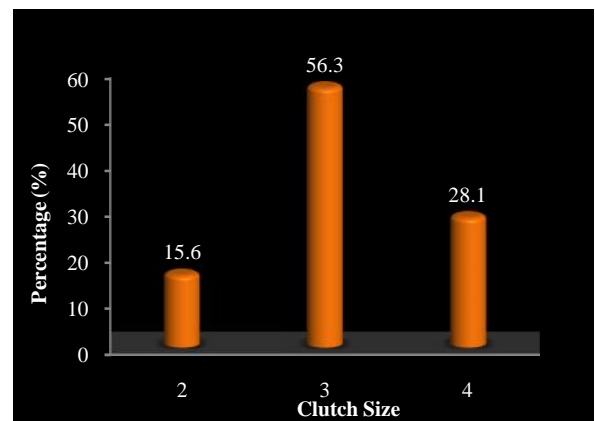

Figure I Graph showing frequency of nests of Common Babbler in study area

Figure 2 Nest of Common Babbler with eggs

Figure 3 Clutch of four eggs

RESULTS AND DISCUSSION

The Common Babbler (*Turdoides caudatus caudatus*) is a common resident breeding species in the dry open and scrubby habitats of the research area with nesting season extending from February to September. The peak breeding period is during May-June just prior to monsoons which seems to be related to the dependence of chicks on adults for food even after fledging. Therefore, raising chicks prior to season when insect (protein rich) food is abundant ensures their survival. Six different species of plants were recorded to be utilized for nesting however thorny bushes were mainly preferred as nesting substrate. Nests were cup shaped constructed by dry grass roots and stems (Fig 2).

Clutch size

A total of 32 clutches of Common Babbler were observed during present study. The clutch size during this study revealed variations from minimum 2 to maximum 4. Among 32 clutches, there were 5 (15.6%) with clutch size 2, 18 (56.3%) with clutch size 3 and 9 (28.1%) with clutch size 4 (Fig 1). Thus, nests with clutch of 3 eggs were significantly more common. Previous workers, Ali (1964), Ali and Fatehally (1967) and Barnes (1981) have mentioned clutch size to be 3 to 4. According to Ali and Ripley (1983), the clutch size is commonly 4, often 3 and exceptionally 5. Sahi (2004) noticed a range of 2 to 5 eggs per nest with 4 being the commonest. Arbabi *et al*. (2008) also recorded the maximum clutch size to be 5. Hosseini Moosavi *et al*. (2011) found clutch size of Common Babbler in Iran to be 1 to 6 eggs per nest except 2 eggs. However, there is considerable similarity between the clutch size recorded in present study and that of Whistler (1949) who reported that usual clutch consists of 3 to 4 eggs, but occasionally only 2 eggs are laid and Samsoor Ali *et al*. (2011) who recorded the clutch size to be 2 to 4 eggs in Tamil Nadu. The mean clutch size recorded during present study was 3.1 ± 0.65 which was less than that recorded by earlier workers. Cramp and Simmons (1993) recorded an average clutch size of 3.4 for 39 clutches in Delhi while Sahi (2004) recorded it to be 3.75 for 30 clutches in Jammu. Furthermore, Sharma (2002) recorded mean clutch size for nest without helper, with one helper and with two helpers to be 3.1 ± 0.1, 3.32 ± 0.2 and 3.5 ± 0.14 respectively. Klomp (1970) stated that the mean clutch size can vary with food supply, habitat, population density, age of the breeding adults, latitude, longitude, altitude and other factors. Moreover, Amadon (1963) putforth that the evolutionary trend among birds has been towards producing fewer young due to the reason that the complex physical skills of flight and food gathering require a long maturation period, as the population of each species approaches the carrying capacity of the environment, competion for food places a premium upon endurance and food gathering skills, especially during the breeding season.

Egg Characteristics

The eggs of Common Babbler were oval in shape, mono-coloured having one broader end and other relatively pointed. They were turquoise blue in colour, smooth and spotless (Fig 3). Same observations were made by Whistler (1949), Cramp and Simmons (1993), Sahi (2004), Arbabi *et al*. (2008), Sharma and Sharma (2011) and Samsoor Ali *et al*. (2011).The eggs were glossy at the time of laying but their colour slightly faded away near hatching. Daily observation regarding egg-laying pattern of Common Babbler revealed that the time interval between two successive laying was approximately 24-28 hrs as reported for a number of other avian species (Beason and Franks, 1974; Aguon and Conant, 1994; Prather and Cruz, 1995; Dhanda and Dhindsa, 1998 and Kumar *et al*., 1999). Eggs were laid on day following completion of the nest however in some nests the bird took gap of 2 to 5 days between completion of the nest and laying of the first egg (latency period). Eggs were usually laid in early morning before 0700 hrs.

The egg characteristics of 30 eggs are given in table 1. The average length of 30 eggs was measured to be 22.1 ± 1.03 mm ranging from 21-24 mm. The average breadth measured was 16.1 ± 0.66 mm ranging from 15-18 mm. These results are in consonance with many other earlier studies (Horak *et al*., 1995; Dolenec, 2002) which have also shown that egg length is more variable than breadth. The average egg weight recorded was 2.5 ± 0.14 gm ranging from 2.2-2.7 gm. Further, the average egg volume was calculated to be 2.93±0.30 cm^3 with minimum 2.41cm^3 and maximum 3.97 cm^3 while the egg shape index was measured to be 72.98 with minimum 62.5 and maximum 80.95. The average length and breadth recorded by earlier workers were 21.2 × 16.1 mm (Bakers, 1926), 21.2 × 16.2 mm (Ali and Ripley, 1983) and 21.2 × 16.5 mm (Barnes, 1981) respectively. Sahi (2004) calculated the mean dimensions of 35 eggs as 22.5 (21.5-23.5) × 18 (16.5-18.5) mm while egg weight was recorded to be 2.4 gm. However, for egg volume and egg shape index no former information was available for comparing with the results of present study.

Statistical analysis

Pearson correlation coefficients (r) between egg variables are shown in table 2. A strong positive correlation was recorded between egg breadth and egg volume whereas a strong but negative correlation was registered between egg length and egg shape index. The correlations between egg length and egg volume and egg breadth and egg shape index were also statistically significant. However, no significant correlations were found between egg length and egg breadth as well as between egg volume and egg shape index.

Acknowledgements

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