



Predator, Interspecific interaction and Anti-predatory behaviour of Red-wattled lapwing (*Vanellus indicus*) in Mount Abu Wildlife Sanctuary and Kumbhalgarh Wildlife Sanctuary

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ABSTRACT

Red-wattled lapwing is ground nesting wader bird and performed various types of antipredator behaviour including vocalization, false incubation, flapping of wings, sitting tight response, broken wing display, chasing and mobbing with predators. During breeding red-wattled lapwing spent most of time in vigilance, calling, foraging, egg incubation, guarding of nests, egg and hatchlings. Vocalization and alarm call behaviour towards predators were more frequently performed during breeding season as compared to non-breeding season. During study, we found four types of species interaction (Type I- Predator feeds upon eggs; Types II-Predator feeds upon eggs and nestlings; Type III- Predator feeds upon eggs, nestlings and adults; Type IV-interspecific interaction between other avian species and red-wattled lapwing for nesting, resting, foraging and feeding) and antipredator behaviour by red-wattled lapwing during the breeding season in Mount Abu Wildlife Sanctuary and Kumbhalgarh Wildlife Sanctuary. During the breeding season, other ground-nesting wader birds (black winged stilt, little ring plover and great thick knee) also compete with the red-wattled lapwing for nesting, roosting, foraging and feeding. During the egg incubation time, false incubation and siting behaviour were more frequently shown, while flying, alarming calls, chasing and mobbing with predators were shown at hatchling time.

Keywords- Red-wattled lapwing, antipredator behaviour, mobbing, nesting, predator

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INTRODUCTION

Birds show a variety of parental defence behaviours, including calling, injury mimicking, false incubation, mobbing, chasing and attacking predators [1]. Attacking a predator may be a dangerous type of parental defence, but it can also be the most effective [2]. Birds exhibit different anti-predator strategies to defend against various sorts of predators in order to enhance their rate of nesting and breeding success [3]. Nest hiding and cryptic behaviour are also helpful in the reduction of threats and attacks of predators on prey during breeding season [4,5]. Waders provide sufficient food and protection for their nestlings and hatchling stages and produce a distinct alarm call to alert nestlings to the types of predator [6,7]. Lapwings are wader birds and prefer a wide variety of open habitats with the presence of plentiful water. They have strong and robust legs, a straight and small bill and rounded edged wings [8]. They live in different types of habitats, including river banks, wet and dry grasslands and border areas of lakes, steppes and arable land, grazed fields, ploughed land and also found around dry water bodies [9,10,11,12,13]. Red-wattled lapwings are territorial breeders, monogamous and also breed in urban areas [14]. The clutch size of a red-wattled lapwing ranges between 3 to 4 egg per nest and nests are typically built on the ground, though nests are occasionally built on flat roofs of houses, particularly in urban areas [15,16]. Male of red-wattled lapwings have more prominent crests and facial wattles as compared to females and sexual dimorphism is not particularly remarkable in this bird [14]. Both sexes participate in incubation activities and the incubation period ranges from 28 to 30 days, which is similar to other Charadriidae species [17]. The breeding season of red-wattled lapwing is from March to August [18]; April to the end of June [19]; and April to May [20]. Anthropogenic activities, predation and trampling have all been identified as factors responsible for egg loss in red-wattled lapwings [21]. Martin T.E. [22] said predation is the most important factor responsible for declining breeding success among red-wattled lapwings. Similar findings were made by [23]; nesting or breeding success in ground nesting birds are highly affected to predation by mammals

and birds species as well as being destroyed by floods and changes in water level. Furthermore, ground nests were frequently damaged by domestic animals and humans interference around nesting areas [23,24]. The strong responses and antipredator behaviour not only warned the responding birds of a potential danger, but they were also contributed to decline in nest predation risk [25]. It's essential to get enough information about nest predators to reduce the impact of nest predation. However, in recent years, the method of recognising nest predators and measuring their contribution has improved due to digital camera technology (Bolton, 2007)[26]. In the similar manner present studied was carried out on the interspecific competition and antipredator behaviour of red-wattled lapwing during the breeding season in Mount Abu and Kumbhalgarh Wildlife Sanctuary of Rajasthan.

MATERIAL AND METHODS-

The interspecific and antipredator behavioural study of the Red-wattled lapwing was carried out during the breeding season in Mount Abu Wildlife Sanctuary and Kumbhalgarh Wildlife Sanctuary from March, 2022 to June, 2022. Behavioural observation was recorded using scan and focal sampling method [27] with the help of Nikon 8x40 binoculars and photographs were taken by a Nikon P1000 and Canon EOS 700D cameras with 150 – 500mm lens from a very safe distance from nesting without disturbing them.

RESULT AND DISCUSSION

During the breeding season red-wattled lapwing spend most of time in vigilance, calling, foraging, egg incubation, guarding of nests, eggs and young once. In breeding season, they forage and feed near the nest areas. The frequency of vocalisation was higher in the breeding season as compared to the nonbreeding season. During study, we found a total of 28 species interactions with red-wattled lapwing during the breeding season in Mount Abu Wildlife Sanctuary (MA-WLS) and Kumbhalgarh Wildlife Sanctuary (KWLS) areas. We observed 21 different species interactions in Mount Abu Wildlife Sanctuary and 28 different species interactions in Kumbhalgarh Wildlife Sanctuary with red-wattled lapwing during breeding season. Out of 28 species, five species belong to mammalian taxa (common mongoose, ruddy mongoose, feral dog, jungle cat, domestic cat and Indian jackal), one species belongs to reptilian taxa (Indian cobra) and the remaining 22 species belong to avian taxa (Table 1). We observed a total of four types of interaction of red-wattled lapwing with other species during the study (Table 1).

Type I-Predators were feed on eggs.

Type II-Predators feed on both eggs and nestlings

Type III-Predators feed on eggs, nestlings and adults

Type IV- Interspecific interaction between other avian species and red-wattled lapwing for foraging, feeding, resting and nesting.

Maximum interactions were found type I category (18 species), followed by type II (10 species), type IV (9 Species) and minimum interaction belongs to type III (7 species) categories (Table 1). Three species of predators (feral dog, Indian jackal and Indian cobra) feed upon the eggs, nestlings and adults of red-wattled lapwing. Three species of birds (shikra, crested serpent eagle and common kestrel) feed upon the eggs and nestlings of red-wattled lapwing. Four species of predators (jungle cat, domestic cat, black kite and white-eyed buzzard) feed upon the nestlings and adults of red-wattled lapwing. Five species of birds (black-headed ibis, grey heron, purple heron, Indian black ibis and glossy ibis) feed upon eggs and also show interspecific competition with red-wattled lapwing for foraging, feeding and resting time. Chestnut bittern and Indian pond heron were competing for foraging and feeding time with red-wattled lapwing. Little ring plover, great thick knee and black-winged stilts were also competing for nesting, roosting, foraging and feeding time. In breeding season, generally both individuals of the red-wattled lapwing forage and feed around the nest. When predators come around the nest, both individuals or sometimes only one individual come around the nest and perform antipredator behaviour like alarm calls, false incubation, flapping and stretching of wings, broken wing display and chasing with predators. During the egg incubation period, red-wattled lapwing more frequently performed sitting on nests and false incubation behaviour when predators were present around the nests. While flying, alarming calls, chasing and mobbing responses were frequently performed during the hatchling and nestling period. The antipredator response of red-wattled lapwings varied depending on predator type and predator distance from nests. During the breeding season, red-wattled lapwing individuals produced more vocalisations as compared to the non-breeding season. Sometimes, red-wattled adult individuals hide their nestlings under their bodies to save them from predators nearby the nests. A few days after hatchling, nestlings are also capable of hiding in cryptic locations for escaping from predators. Nestlings hide under grass, shrubs and sometimes in the deep impression of cattle pug marks in the presence of predator. The flock size of red-wattled lapwing was also increased in the breeding season as compared to the non-breeding season. Feral dogs were frequently

observed moving around nesting red-wattled lapwings in both study areas. Sometime feral dogs also try to chase the nestlings and adults of red-wattled lapwings. Livestock movement around wetlands also reduces the breeding success of red-wattled lapwing. Because livestock movement around a wetland destroyed nests and eggs present around a wetland. Trampling of eggs by livestock movement was also observed in both study areas.

Table 1- list of species and types of interaction found with red-wattled lapwing during the breeding season

Sr. No	Common name	Scientific name	Study areas		Types of Interactions with red-wattled lapwing			
			MA-WLS	KWLS	Type I	Type II	Type III	Type IV
1	Common mongoose	<i>Herpestes edwardsi</i>	+	+	+	+	+	+
2	Ruddy mongoose	<i>Herpestes smithi</i>	+	+	+	-	-	-
3	Feral dog	<i>Canis lupus</i>	+	+	+	+	+	-
4	Jungle cat	<i>Felis Chaus</i>	-	+	+	+	+	-
5	Domestic cat	<i>Felis catus</i>	+	+	-	+	+	-
6	Indian Jackal	<i>Canis aureus indicus</i>	-	+	+	+	+	-
7	Indian Cobra	<i>Naja naja</i>	+	+	+	+	+	-
8	House crow	<i>Corvus splendens</i>	+	+	+	-	-	-
9	Jungle crow	<i>Corvus macrorhynchos</i>	+	+	+	-	-	-
10	Rufous Treepie	<i>Dendrocitta vagabunda</i>	+	+	+	-	-	-
11	Glossy Ibis	<i>Plegadis falcinellus</i>	+	+	+	-	-	+
12	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	+	+	+	-	-	+
13	Indian Black Ibis	<i>Pseudibis papillosa</i>	+	+	+	-	-	+
14	Indian Pond Heron	<i>Ardeola grayii</i>	+	+	-	-	-	+
15	Grey Heron	<i>Ardea cinerea cinerea</i>	+	+	+	-	-	-
16	Purple heron	<i>Ardea purpurea</i>	+	+	+	-	-	-
17	Shikra	<i>Accipiter badius</i>	+	+	+	+	-	-
18	Crested serpent-Eagle	<i>Spilornis cheela</i>	+	+	+	+	-	+
19	Common Kestrel	<i>Falco tinnunculus</i>	+	+	+	+	-	-
20	Greater Coucal	<i>Centropus sinensis</i>	+	+	+	-	-	-
21	Little Ringed Plover	<i>Charadrius dubius</i>	+	+	-	-	-	+
22	Black-winged stilt	<i>Himantopus himantopus</i>	+	+	-	-	-	+
23	Egyptian vulture	<i>Neophron percnopterus</i>	-	+	+	-	-	-
24	Black kite	<i>Milvus migrans govinda</i>	-	+	-	+	+	-
25	Great thick knee	<i>Esacus recurvirostris</i>	-	+	-	-	-	+
26	Chestnut Bittern/Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>	-	+	-	-	-	+
27	River Tern	<i>Sterna aurantia</i>	+	+	-	-	-	+
28	White eye buzzard	<i>Butastur teesa</i>	-	+	-	+	+	-

Note- MA-WLS- Mount Abu Wildlife Sanctuary, KWLS- Kumbhalgarh Wildlife Sanctuary



Figure 1- Feral dog trying to chase red-wattled lapwing



Figure 2- Red-wattled lapwing performed an antipredatory response towards the purple heron



Figure 3- Feral dog movement around the nesting habitat of red-wattled lapwing



Figure 4- Flapping wing display behaviour of a red-wattled lapwing towards an Indian Cobra



Figure 5- Anti-predatory behaviour of red-wattled lapwing towards the Indian Cobra



Figure 6- False incubating behaviour of red-wattled lapwing



Figure 7- Red-wattled lapwing hide nestling under body protecting from predator



Figure 8- Nestling of Red-wattled lapwing hide in cattle pug marks



Figure 9 – Indian Jackal movement around the nesting habitat of red-wattled lapwing

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