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Diversity and Distribution of Captive Parrots (Aves: Psittaciformes) in Urban Areas of Hyderabad, Sindh, Pakistan

Wakeela Gul Mughal, Farheen Shaikh* Sidra Afreen Ansari, Saira bano Bhatti

Department of Zoology, University of Sindh, Jamshoro, 76080, Pakistan.

Abstract

The main objective of this research was to collect maximum number of species of the captive birds from the urban area of Hyderabad, Sindh, Pakistan. All species of captive parrots (Chordata: Aves: Psittaciformes) were examined in urban areas of Hyderabad, Sindh, Pakistan. A survey was conducted between April 2017 and February 2018. The species belonged to the large parrot family Psittacidae. Captive parrots from both subfamilies Arinae and Psittacinae were included and identified from five study sites. This was the first research study on captive parrots conducted in the urban areas of Hyderabad and described three species from the subfamily Psittacinae and three from Arinae The identified species were Blue and Yellow Macaw *Ara ararauna* (Linnaeus, 1758), Red and Green Macaw *Ara chloropterus* (Gray, GR, 1859), Scarlet Macaw Ara macao (Linnaeus, 1758), English Sun Parakeet Aratinga solstitialis (Linnaeus, 1758), African Grey Parrot Psittacus erithacus (Linnaeus, 1758) and Pineapple Conure Pyrrhura molinae (Massena and Souance, 1854). The study area Hyderabad was divided into five urban areas for the collection of samples. The areas included were Heerabad, Hyderabad Zoological Garden, Latifabad, Mir Fazal Town and Paqqa Qila. A total of 80 specimens were collected. All were new records from urban areas of Hyderabad Sindh, Pakistan. 'The present study found that captive parrots were not as widely distributed compared to other captive birds in the region.

Key Words: Diversity, Hyderabad, parrots, distribution, Psittaciformes, Psittacidae, Sindh.

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***Correspondence:** Farheen Shaikh, Department of Zoology, University of Sindh, Jamshoro, 76080, Pakistan. Tel: +92 336 0864980. Email: farheen.shaikh@usindh.edu.pk

Introduction

Birds are among the beautiful creatures of the world. They are warm blooded, attractive, having feathers, a tootless beak, produce hard shell eggs and protect their young ones carefully. Birds belong to the Class, Aves which includes various families, such as Anatidae, Phasianidae, Columbidae, Corvidae, Paridae, Passeridae and Psittacidae. The family Psittacidae includes parrots. Psittaciformes (Chordate: Aves) the order of parrots generally represents 402 species in 101 genera. The order is most diverse group of parrots with great morphological variations and foraging behavior. It includes amazons, macaws, lorikeets, cockatoos and parakeets [1]. The study of parrots' diversity, distribution, patterns and factors allow us to understand their more ecological role in the biotic environment. Monitoring of parrots species in the natural environment is an important and effective task for conservation and management of both problematic and threatened species. Ancient civilizations like Romans, Greeks and Egyptians used to have parrots as pets and domesticated them. Parrots are known as Psittacine belong to the genus Psittacus with a strong curved beak, a vivid or multi-coloured appearance and clawed feet. Parrots are most intelligent birds as they imitate human speech and seems to be close relative of

family Passeriformes (Chordate: Aves) perching birds [2, 3], which business and trade is important market in terms of economics.

The captive parrots act as pet bird and live in captivity. Birds may serve as effective indicators in biological research because they are sensitive to ecological and environmental changes. They are effective indicators for monitoring ecological health. Avian distribution, prevalence and biodiversity have significant part in investigating, identifying, and exploring the health of native and domestic biosphere [4, 5, 6]. There are four dominated families of Psittacine birds are existing in the world but the presence of many numbers of species in one region depends on availability of water supply and agriculture of that area. The four families include: (Psittaculidae) old world parrots, (Psittacidae) African and new world parrots, (Cacatuidae) Cockatoos and (Strigopidae) New Zealand parrots. One third species of captive parrots is going toward the extinction due to disaster situation of nature or unfavorable condition of the environment according to (Threatened species of Red list, international union of conservation of nature IUCN) than any other species of birds. 'Captive parrots assist the ecosystem by dispersing plant species and aiding forest regeneration through eating fruits, seeds, nuts, and buds, and excreting seeds in various locations [7].

Psittaciformes (Chordate: Aves) birds have more density and abundance in South Asia ncluding Pakistan and its adjoining countries. The biosphere of these regions is providing life sustaining capsule for the growth and development of birds' population successfully. Native parrot species are common in Pakistan, presenting three types of parakeets which are Alexandrine *Psittacula eupatria* (Linnaeus, 1766), Rose-ringed *Psittacula krameri* (Scopoli, 1769) and Plum-headed *Psittacula cyanocephala* (Linnaeus, 1766). The availability of resident species is not only important for ecology of the region but also taking important hold and significance [8]. The most common local residential species of parrots of Southeast Asia include the Red-breasted parakeet *Psittacula alexandri* (Linnaeus, 1758), Blossom-headed parakeet *Psittacula roseata* (Biswas, 1951) and Blue-rumped parrot *Psittinus cyanurus* (Foster, JR, 1795). The availability of particular parrot's species has high advantage in pet business contribution to social security and well-being of the region and where they are reared, bred and sold [3, 8, 9].

The high prevalence and diversity of captive parrots are frequently available in Australia and South America due to favorable temperature and availability of water supply. Captive parrots (Psittacidae: Psittaciformes) belong to the Phylum (Chordata: Aves) are categorized and supported by the unique morphological Skull than any other groups of birds. 'They have a dominant upper maxilla that is almost not fixed to the skull and usually moves downward. 'The maxilla is a movable part, sharp, and bears slight pressure during ingestion and feeding. 'The lower mandible is a less dominant part of the mouth and is sharp and short. The cavity of the mouth holds powerful tongue which is muscular and movable. A different recognizable structure of lower limbs was evident [10, 11, 12].

A unique or unusual hinge-like cranio-facial articulation was evident in the skull (head) of captive parrots. Without turning its head, a parrot can observe areas below the tip of its bill, to the sides, behind, and above its head [12]. The foot is fully zygodactyl type (two toes cladding onward and two primitive) as in cuckoos allies (Cuculidae) and woodpeckers (Piciformes), however captive parrots have typical form of zygodactyl foot which is very much different other birds with change of expose toe and consequently similar toe arrangement was appeared in order Psittaciformes which use separately.

The zygodactyl type of foot in captive parrots and their presumed capability of VTOL, vertical takeoff and landing particularly join origination of captive parrots in thick, solid, compact tropical forests. Most species of captive parrots are capable of utilizing their feet to similar way as human being using their hands, and influence on food and further targeted content with magnitude and extremity of quickness. Captive parrots that live in captivity are generally not polygamous breeders who nest in holes and cavities and do not hold territories [6, 13, 14].

Methods

Captive parrots (Aves: Psittaciformes) were studied in captivity. Data were collected with the help of bird keepers, parrot owners, and bird enthusiasts in different study localities of urban areas of Hyderabad, Sindh, Pakistan (Table I & II). The study was conducted between April 2017 and February 2018. 'Hyderabad has an arid and sandy climate. The nature of soil is calcareous and has different kinds of plants and trees. Hyderabad, in the southern part of Sindh, has a great variety'of wild and captive life species including mammals, birds and reptiles. 'Major bird species include crows, pigeons, sparrows, and parrots, ranging from small to large in size. 'The climate of the area is hot, and the weather remains warm throughout the year. During the present study 80 specimens were collected and studied. 22 visits were conducted at the study sites, both in the morning and in the evening. Morning visits were conducted between 7:30 a.m. and 11:30 a.m. while evening visits were conducted between 4:30 p.m. and 7:30 p.m.

The distribution of species of parrots in particular areas is influenced by their social behavior. The urban localities of Hyderabad were included Heerabad, Hyderabad Zoological Garden, Latifabad, Mir Fazal Town and Paqqa Qila. An internationally recognized measuring scale, including vernier calipers, was used for identifying and describing the diversity and distribution of species. Following Morphometric parameters included length of body, length of beak, distance and length of fore limbs, distance and length of hind limbs, tail length and body weights were analyzed to examine Captive parrots species in study areas. In addition, dorsoventral body colour was studied individually in all species of the family Psittacidae (Chordate: Aves: Psittaciformes) [6, 8, 15, 16].

Results

'The present study was conducted on one of the large families, Psittacidae (Chordate: Aves: Psittaciformes) of captive parrots' from April 2017 to February 2018. The research work was conducted in urban areas of Hyderabad, Sindh, Pakistan. A total of 22 visits were made in morning and evening to investigate the distribution, prevalence and biodiversity of captive parrots in the study region. Five local sites were selected and visited i.e. Heerabad, Hyderabad Zoological Garden, Latifabad, Mir Fazal Town and Paqqa Qila (Fig.1-3).

During the present study, 80 captive Psittacidae birds were collected and were identified as six species Blue and Yellow Macaw *Ara ararauna* (Linnaeus, 1758), Red and Green Macaw *Ara* chloropterus (Gray, GR, 1859), Scarlet Macaw Ara macao (Linnaeus, 1758), English Sun Parakeet Aratinga solstitialis (Linnaeus, 1758), African Grey Parrot Psittacus erithacus (Linnaeus, 1758) and Pineapple Conure Pyrrhura molinae (Massena and Souance, 1854) (Fig. 1 &.2). Only four genera were identified: Ara, Aratinga, Pyrrhura and Psittacus which belong to two subfamilies of Psittaciformes birds are (Aves: Psittacidae: Arinae) and (Aves: Psittacidae: Psittacinae) respectively. Diversity of reported Captive parrots was described up to the species (Table 1). Breeding season and incubation periods of Captive parrots were calculated (Table 2).

Modified environmental areas of homes like encroaching are most important for availability of parrots. The locality, Latifabad is the most favorable and desired site where Psittacidae parrots were kept as pets, pet trade and for business. All species show a variation between size and colors. Moreover, environment also affected the weight of species in captivity. Latifabad was observed to be the most populated area. The maximum weight of species *Ara ararauna* was recorde as 1080 gms. Beak and hind limbs were observed almost same in size and length. The total number of species of Captive parrots, male and female ratio, prevalence and measurements of their body parts were taken (Table 3, 4, 5).

Table1. Diversity of captive parrots recorded during the present survey.

Order	Family	Subfamily	Genus	Species
Psittaciformes	Psittcidae	Arinea	Ara	Ara araruna (Linnaeus, 1758)
Psittaciformes	Psittcidae	Arinea	Ara	Ara chloropterus (Gray, GR, 1859)
Psittaciformes	Psittcidae	Arinea	Ara	Ara macao (Linnaeus, 1758)
Psittaciformes	Psittcidae	Arinea	Aratinga	Aratinga solstitialis (Linnaeus, 1758)
Psittaciformes	Psittcidae	Arinea	Psittacus	Psittacus erithacus (Linnaeus, 1758)
Psittaciformes	Psittcidae	Arinea	Pyrrhura	Pyrrhura molinae (Massena and

Table 2. Clutch Size and Incubation period of identified captive parrots in the study area.

Species Name	Sexual Maturity (Years)	Breeding Season	Clutch Size	Incubation period (Days)
Ara ararauna (Linnaeus, 1758)	3-4	January- July	2-3	24-28
Ara chloropterus (Gray, GR, 1859)	3-4	December	2-3	28
Ara macao (Linnaeus, 1758)	3-4	Year-around	2-4	24-25
Aratinga solstitialis (Linnaeus, 1758)	2	July– November	3-4	23 -27
Psittacus erithacus (Linnaeus, 1758)	5-7	October-December	3-4	28-30
Pyrrhura molinae (Massena and Souance, 1854)	4-6	August – October	7-9	25-26

Table 3. Total number of collected specimens with percentage of male and female Psittacidae Species.

S:no	Species	Male (n)	%	Female (n)	%	Total
01	Ara ararauna (Linnaeus, 1758)	07	70	03	30.	10
02	Ara chloropterus (Gray, GR, 1859)	09	75	03	25	12
03	Ara macao (Linnaeus, 1758)	07	63.63	04	36.36	11
04	Aratinga solstitialis (Linnaeus, 1758)	10	71.42	04	28.57	14
05	Psittacus erithacus (Linnaeus, 1758)	12	66.66	06	33.33	18
06	Pyrrhura molinae (Massena and Souance, 1854)	08	53.33	07	46.66	15
	Percentage %	53	66.25	27	33.75	80

Table 4. Prevalence and diversity of Psittacine captive parrots in urban areas of Hyderabad.

S.no	Name of Species	Heerabad (n)	HydZoo Garden (n)	Latifabad (n)	MirFazal Town (n)	Pakka Qilla (n)	Total specimen
01	Ara ararauna (Linnaeus, 1758)	03	01	04	-	02	10
02	Ara chloropterus (Gray, GR, 1859)	05	01	04	02	-	12
03	Ara macao (Linnaeus, 1758)	01	-	04	02	04	11
04	Aratinga solstitialis (Linnaeus, 1758)	04	02	04	-	04	14
05	Psittacus erithacus (Linnaeus, 1758)	04	02	07	03	02	18
06	Pyrrhura molinae (Massena and Souance, 1854)	03	-	05	03	04	15
	Total	16	06	27	13	18	80
	%	20	7.5	33.75	16.12	22.5	

Table 5. Measurements of various body parts of all collected Psittacidae members.

Name of species	Body parameters					
	Body length (mm)	Fore limb length (mm)	Hind limb length (mm)	Beak length (mm)	Tail length (mm)	Body weight (g)
Ara ararauna	850	580	50	50	560	1000
Ara chloropterus	840	560	75	45	560	950
Ara macao	690	570	60	45	420	950
Aratinga solstitialis	300	190	60	45	420	100
Psittacus erithacus	330	280	50	40	100	400
Pyrrhura molinae	230	150	25	30	135	65

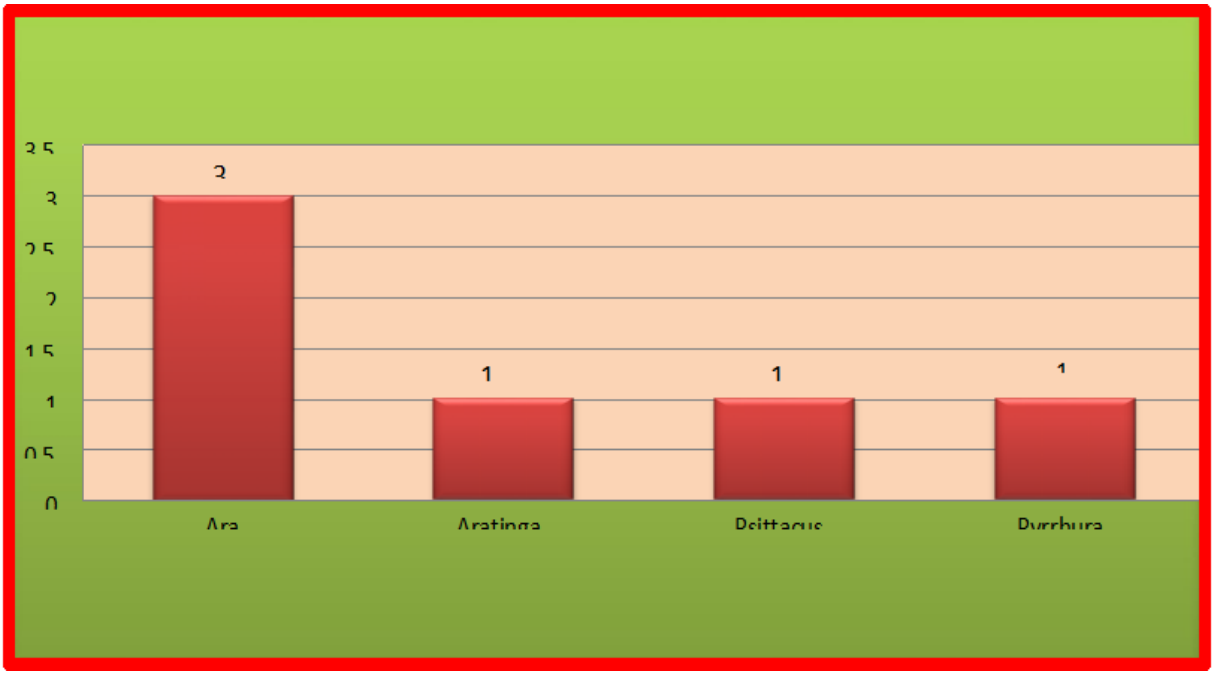

Figure 1. Presentation of various genera and species belonging to family Psittacidae.

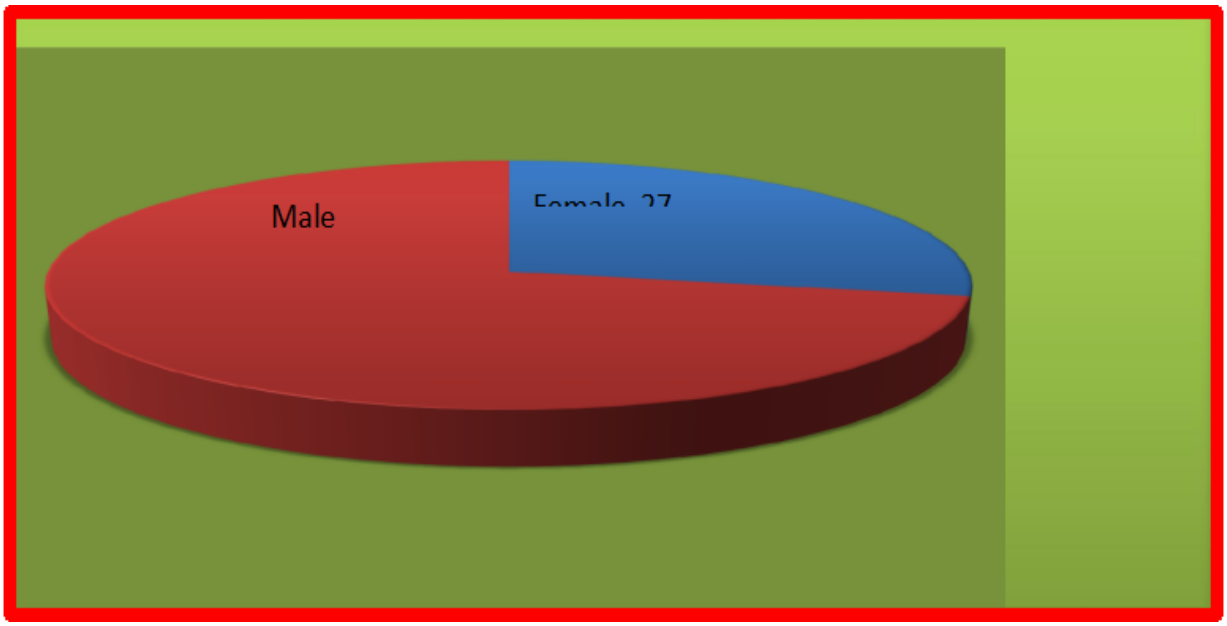

Figure2. Percentage of male and female Psittacidae specimens.

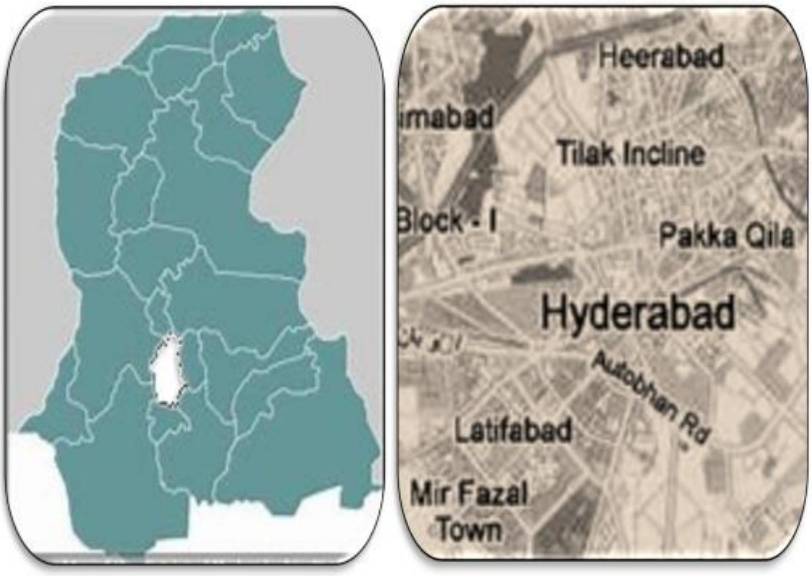

Figure 3. Map showing the study sites of urban areas of Hyderabad, Sindh, Pakistan.

Discussion

Parrots are social birds and prefere to live in small to large groups. They have been traded and transported by humans for more than 2000 years and this trading is continuing today successfully. The transportation of species involves approximately 402 recognized species [17]. Parrots are most endangered group of birds in the world and are widely distributed among all birds. It was our goal in this review to attempt to estimate the number of Captive parrots in the selected study areas. This effort updates past estimates [18, 19] and provides a combined database of parrot specific records in the native and novel areas of the world. They are colourful and their growth and development depend on the availability of water [20, 21]. Captive parrots (order Psittaciformes) are not identical and consistent group of birds and are simply classified into different groups on the basis of their morphological characteristics [6, 22, 23]. Captive parrots are endangered or unsafe more to preying and scavenging habits and because of living style in holes or nest to the entrance cavity, growing and development of immature eggs in the nest, energetic and cheerful young parrots in the nest that intended them responsive to charge and strike [8, 24, 25]. More than 36% of nests were damaged during the nestling period.

Conclusion

The integration of species distribution and diversity of Captive parrots in particular study areas reveals management and conservation of invasive threatened species. This is the first study on the diversity and distribution of Captive parrots in urban areas of Hyderabad, Sindh, Pakistan. Parrots are interesting and attractive taxonomic group of birds for ecological studies. The family (Chordate: Aves: Psittaciformes) Psittacidae consists of both old world and new world parrots. The nature of the biosphere existence of captive parrots is tropical and subtropical environment throughout the world. Psittacidae family is classified in to two major subfamilies Arinae and Psittacinae. A total of 80 specimens, only six species were recognized on the basis of their diversity and distribution in nature. The species were identified Blue and Yellow Macaw Ara ararauna (Linnaeus, 1758), Red and Green Macaw Ara chloropterus (Gray, GR, 1859), Scarlet Macaw Ara macao (Linnaeus, 1758), English Sun Parakeet Aratinga solstitialis (Linnaeus, 1758), African Grey Parrot Psittacus erithacus (Linnaeus, 1758) and Pineapple Conure Pyrrhura molinae (Massena and Souance, 1854). All species were classified in four genera Ara, Aratinga, Pyrrhura and Psittacus. First three genera belong sub families Arinae and Psittacinae.

Ethics Approval and Consent to Participate
Not applicable.

Human and Animal Rights
All experimental protocols were performed on the basis of guidelines provided by the national institute of care and use for animals.

Consent for Publication
Not applicable.

Availability of Data and Materials
The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

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Conflict of Interest
The authors declare no conflict of interest, financial or otherwise.

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