



Chital (*Axis axis* Erxleben, 1977) as prey base in Mukandra Hills Tiger Reserve, Rajasthan, India

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Received: 27 May 2022 / Revised: 10 June 20212/ Accepted: 10 July 2022 / Published online: 17 July 2022.

How to cite: Rajawat, R.I. (2022). Chital (*Axis axis* Erxleben, 1977) as prey base in Mukandra Hills Tiger Reserve, Rajasthan, India, Scientific Reports in Life Sciences 3(2), 66-71. DOI: <https://doi.org/10.5281/zenodo.6847040>

Abstract

Chital (*Axis axis*) is one of the most important prey species of top carnivores as is evident from studies in wild. The national animal Tiger (*Panthera tigris*) is restricted to the Tiger Reserves in India, which are the only safe site for survival of the wild population of this big cat. Mukandra Hills Tiger Reserve (MHTR) in southeast Rajasthan was notified in 2013 as the site to establish a third home for the tiger in Rajasthan. Thirty villages were to be rehabilitated outside the tiger reserve to create a large natural habitat free from anthropogenic disturbance for the tigers. Chital was found as the most abundant wild prey species in this tiger reserve. The study was carried out during 2017-18. In most of the sightings, Chital was observed in small groups of 4-10 individuals of mixed age and sex in a herd. It was found that the total available wild ungulates prey base was less than the wild prey population reported in other studies in most of the tiger reserves of India. While this prey base can support a small reintroduced population of 6-10 Tigers, it is recommended that efforts to develop a sufficient wild prey base be given the highest management priority. In a bid to improve its prey base, at least 500 chitals were translocated during the study period from different captive sites in India. Hence, the Chital population is continuously increasing in MHTR, and has been proved a bulk of the diet for already reintroduced four tigers in this fascinating forest.

Keywords: Diet analysis, Conservation, Captive treatment, Ungulates

Introduction

India has been a pioneer country in the conservation of wildlife. Industrialization and the increasing human population have produced enormous pressure on wildlife and its habitat, resulting in the loss of wildlife and its habitat. The population of wild ungulates depends on

the condition of the habitat and the predator-prey relationship (Gautam, 2013). Predator-prey relationship in Indian wildlife is displayed by prey “Spotted deer or Chital” (*Axis axis*) and predator “tiger” (*Panthera tigris*). Chital is the key ungulate prey species for the keystone species of forest (Johansingh, 1983; Chellam, 1993; Khan, 1995; Singh and Gibson, 2011; Wegge et. al., 2009; Khan et. al, 1996). Thus, Chital accounts for a bulk of the Tiger’s diet and Chital is vital for the survival of the tiger (Johansingh, 1992; Stoen and Wegge, 1996; Biswas and Sankar, 2002; Bagchi et al, 2003).

Chital is a resident of the Indian subcontinent and was introduced in the USA and Australia (Prater, 1934; Schaller, 1967). Chital population in India is well below the carrying capacity of tiger reserves as a consequence of competition for grazing with livestock and poaching. Chital populations are vulnerable to habitat fragmentation, conversion, and destruction. Chital is usually found at lower elevations in a mixed dry deciduous forest (Ables, 1977). It inhabits the ecotone between grasslands and dense forests (Moe and Wegge, 1997; Chandra, 2013). It prefers woodland-grassland habitats (Noor et. al., 2013; Sharma and Sharma, 2014). It usually avoids dense forests and usually prefers roadside clear areas (Varman and Sukumar, 1995). Chital is usually seen as associated with langur (Prater, 1971; Newton, 1989) Chital is a socially timid animal. Thus, antipredatory activities are a crucial social behavior (English, 1992). Chital feeds on a number of plants as food (Johansingh and Sankar, 1991) and shifts from grazing to browsing and feeding on fallen leaves in different seasons, according to the availability of food (Khan, 1994). The study area Mukandra hills Tiger Reserve was notified as a tiger reserve in 2013, hence tiger reintroduction was the utmost priority. Prey base was an important issue for tiger reintroduction. The study aimed to decide the availability of prey bases. Thus, the study was conducted to estimate the most abundant prey species and characterize preferred ungulate habitats crucial for limiting prey abundance.

Results

The present study was conducted during 2016-18. Data were collected from primary as well as secondary sources. The primary data were collected from direct observation of study animals. The preferred method for the identification of animals in wild is to observe the animals with binoculars (Mathur, 2002). The fixed-point counts were used to observe the abundance. This technique was suitable for broken hilly areas and for the key prey species which live in herds. An observational study was done by scan sampling technique (Altmann, 1974). Chital is a social animal so grouping behavior was the main aspect of this study. The Chital herds were observed from dawn to dusk on data sheets i.e., Ethograms. The observations were carried out

with the help of a camera and binoculars. Data were recorded at the water point and road transects as well. The present study report described the status, abundance, and distribution of Chital as the most important key prey species. Chital was the most abundant and main prey species among all ungulate species. Prey base was found unevenly distributed among all ranges. Rawtha range reported a maximum number of Chital followed by Borabas, Darrah, and Kollipura range but Gagron and Jawahar Sagar Ranges did not witness Chital presence (Fig. 1).

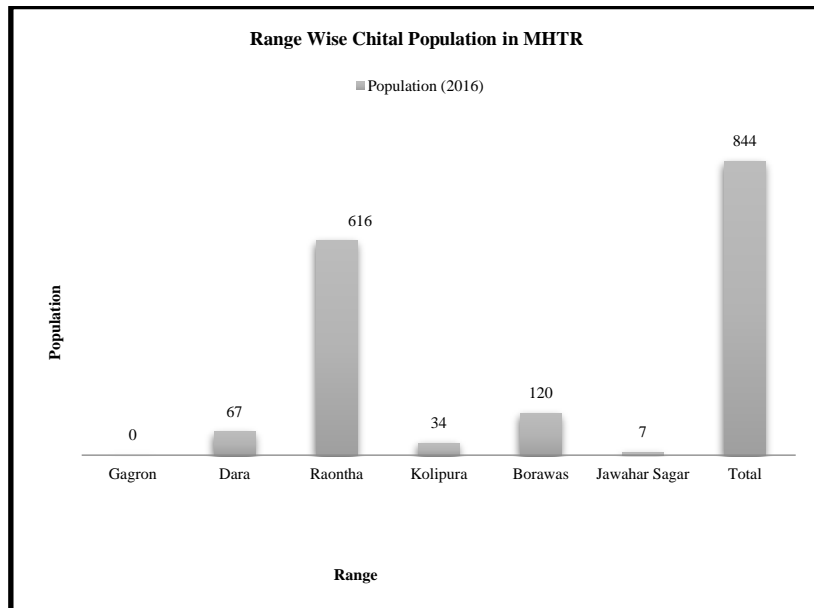


Figure 1 Range Wise Chital Population in MHTR

Five wild ungulate prey species were present including Chital, Sambhar, Nilgai, Chinkara, and Wild Pig. Chital population was consistently proliferating since the notification of the tiger reserve (Fig. 2).

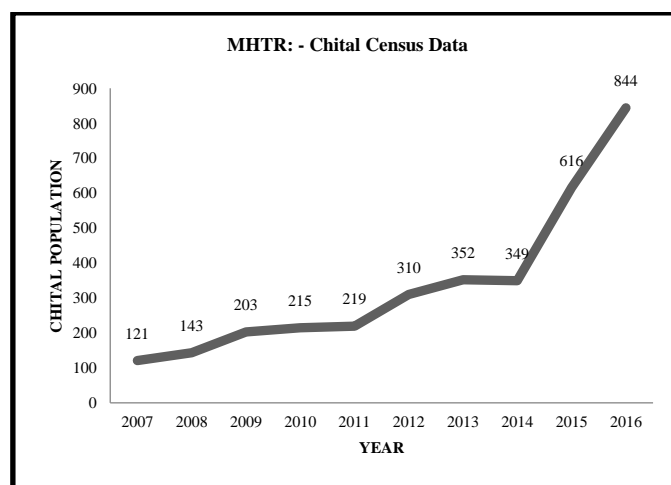


Figure 2. MHTR- Chital Census Data

Discussion

Predator population depends on prey population hence details of prey population were required for reintroduction and conservation planning for the tiger (Dave, 2008; Bagchi et. al., 2004; Nama et. al., 2013). Chital was identified as the most abundant ungulate prey species in Mukandra similar to the other tiger reserves (Karanth and Sunquist, 1992; Eisenberg and Lockhart, 1972; Dinerstein, 1980; Graf and Nicholas, 1966). Chital forms a medium-sized group and is observed in herds of 10-30 animals (Nikica et. al, 2008). Chital was observed with the highest mean and typical group size among ungulates (Bagchi et. al., 2008). Chital formed large groups during breeding and monsoon season. Their aggregation grows from evening onwards and accounts for their movement towards night resting spots in open grassland (Sharatchandra and Gadgil, 1975).

There was no significant relationship between herd size and population. The change in mean group size for a given population was not a result of the change in population size. The change in grouping behavior was probably the result of the season on social organization. Chital group members lack social bonding and frequently join or leave the group, indicating the fluid group nature. This was determined by the availability of food, habitat structure, and predation pressure (Barrette, 1991). The sex ratio was skewed toward female (Khan and Vohra, 1992; De silva and De Silva, 2001; Srinivasulu, 2001; Majumder, et. at., 2013). In Chital, males were observed with different antlered conditions, indicating that breeding occurs throughout all seasons. This was further proved by fawning during the whole year. Almost all the fertile females conceived and deliver the young one (Krishnan, 1972) Only a few dominant stags participated in breeding (Sharatchandra and Gadgil, 1980).

Conclusions

Chital preferred to form small and medium-sized herds. Chital group size varied between 1 to 65. Health condition was represented well by fit body condition. This was due to the availability of various types of plants, fallen leaves, browse, and fruits in different seasons.

Acknowledgments

I extend my sincere thanks to Dr. Subhash Chandra for interpreting of results. I extend my sincere thanks to all the officers of the forest department, especially Field Director and DCF, MHTR for their support during the field visit.

References

Altmann J. 1974. Observational study of behaviour: sampling methods. *Behaviour* 49, 227-267.

- Bagchi S., Goyal S.P., Sankar, K. 2003. Prey abundance and prey selection by tigers (*Panthera tigris*) in a semi-arid dry deciduous forest in Western India. *Journal of Zoology*, 285-290.
- Bagchi S., Goyal S.P., Sankar K. 2004. Herbivore density and biomass in a semi-arid tropical dry deciduous forest of western India. *Journal of Tropical Ecology* 20, 475-478.
- Bagchi S., Goyal S.P., Sankar K. 2008. Social organization and population structure of ungulates in a dry tropical forest in Western India. *Mammalia* 72, 44-49.
- Barrette C. 1991. The size of Axis deer fluid groups in wilpattu National Park, Sri Lanka. *Mammalia* 55, 207-220.
- Biswas S., Sankar K. 2002. Prey abundance and food habit of Tigers (*Panthera tigris tigris*) in Pench National Park, Madhya Pradesh, India. *Journal of Zoology* 256, 411-420.
- Dave C.V. 2008. Ecology of Chital (*Axis axis*) in Gir. Ph. D. Thesis. Saurashtra University. Pp 284
- De Silva M., De Silva P.K.D. 2001. Group composition, sex ratio, and seasonality of spotted deer in Yala Protected Area Complex, Sri Lanka. *Journal of South Asian Natural History* 5 (2), 135-141.
- Dinerstein E. 1980. An ecological survey of the Royal Karnali-Bardia Wildlife Reserve, Nepal. Part III: Ungulate populations, *Biological Conservation* 18, 5-37.
- English A.W. 1992. Management Strategies for Farmed deer (The Biology of Deer). Springer-Verlag New York, Inc., 189-190.
- Eisenberg J.F., Lockhart M. 1972. An ecological reconnaissance of Wilpattu National Park, Ceylon. *Smithsonian Contributions to Zoology*, 101, 1-118.
- Gautam D.N. 2013. Assessment of wild ungulates in the Karnali flood plain of Bardia National Park, Nepal. *International Journal of Conservation Science* 4 (1), 87-94.
- Graf W., Nichols L. 1966. The Axis deer in Hawaii. *Journal of Bombay Natural History Society* 63, 629-734.
- Johansingh A.J.T., Sankar K. 1991. Food plants of Chital, Sambar, and Cattle on Mundanthurai Plateau, Tamil Nadu, South India. *Mammalia* 55, 57-66.
- Johansingh, A.J.T. 1983. Large Mammalian Prey Predator in Bandipur. *Journal of Bombay Natural History Society* 80(1), 517-526.
- Johansingh A.J.T. 1992. Prey selection in three large sympatric carnivores in Bandipur. *Mammalia*, 56, 517-526.
- Karanth K.U., Sunquist M.E. 1992. Population Structure, Density, and Biomass of Large Herbivores in the Tropical Forests of Nagarahole, India. *Journal of Tropical Ecology* 8, 21-35.
- Khan J.A., Vohra U. 1992. Group size and group composition of chital (*Axis axis*) in Gir, Gujarat, India. *Mammalia* 56, 662 – 665.
- Khan J.A., Chellam R., Rodgers W.A., Johnsingh A.J.T. 1996. Ungulate densities and biomass in the tropical dry deciduous forests of Gir, Gujarat, India. *Journal of Tropical Ecology* 12, 149-162.
- Khan J.A. 1994. Food habits of ungulates in dry tropical forests of Gir Lion Sanctuary, Gujarat, India. *Acta Theriologica* 39 (2), 185-193
- Khan, J. A. (1995). Conservation and management of Gir lion sanctuary and national park, Gujarat, India. *Biological Conservation* 73, 183-188

- Krishnan M. 1972. An ecological survey of larger mammals of peninsular India. *J. Bombay Nat. Hist. Soc.* 69, 469-501.
- Mathur R. 2002. Animal Behaviour. Rastogi Publication, Pp 280.
- Moe S.R., Wegge P. 1997. The effect of cutting and burning on grass quality and axis deer use of grassland in lowland Nepal, *Journal of tropical ecology* 13, 279-292.
- Nama K.S., Meena H.M., Lal G., Kumar, S. 2013. Dietary composition of Leopard (*Panthera pardus fusca*) in Mukandra Hills National Park, Kota, Rajasthan, India. *International journal of pure and applied Bioscience* 1(6), 72-76.
- Newton P.N. 1989. Association between Langur Monkey (*Presbytis entellus*) and Chital deer (*Axis axis*): Chance encounter or a Mutualism. *Ethology* 83, 89-120.
- Nikica S., Dean B., Tihomir F., Tomislav T., Graciano P. 2008. The Axis deer (*Axis axis*) in Brijuni National Park. *Journal Central European Agriculture* 9 (2), 317-322.
- Noor A., Habib B., Kumar, S. 2013. Habitat selection and niche segregation between Chital and Nilgai in Keoladeo National Park, India. *European Journal of Zoological Research*, 1-9.
- Prater S. 1934. The wild animals of the Indian Empire. *J. Bombay Nat. Hist. Soc.* 37, 76-79.
- Prater S. 1971. The Book of Indian Animals. Bombay Natural History Society & Oxford Press. Pp324.
- Schaller G.B. 1967. The deer and the tiger: A study of wildlife in India. University of Chicago Press, Chicago. Pp370 .
- Sharatchandra H. C., Gadgil M. 1975. A year of Bandipur. *Journal of Bombay Natural History Society* 72 , 625-647.
- Sharatchandra H.C., Gadgil M. 1980. On the time budget of different life-history stages of Chital (*Axis axis*). *J. Bombay nat. Hist. Soc* 75, 949-960.
- Sharma S., Sharma M. 2014. Habitat utilization of Chital in Keoladeo National Park, Bharatpur, Rajasthan. *World Journal of Applied sciences and Research*, 13-17.
- Singh H.S., Gibson L. 2011. A conservation success story in the otherwise dire megafauna extinction. *Biological Conservation* , 1-5.
- Srinivasulu C. 2001. Chital (*Axis axis* Erxleben, 1977) herd composition and sex ratio on the Nallamala Hills of Eastern Ghats, Andhra Pradesh, India. *Zoo's Prints Journal* 16(12), 655-658.
- Stoen O.G., Wegge P. 1996. Prey selection prey removal by tiger (*Panthera tigris*) during the dry season in lowland Nepal. *Mammalia* 60, 363-373.
- Chandra S. 2013. Indian Ungulate Biodiversity Conservation under Captivity and Wild. Lambert Academic Publishing, Pp 141.
- Varman K.S., Sukumar R. 2005. The line transect method for estimating densities of large mammals in a tropical deciduous forest: An evaluation of models and field experiments. *Journal of Bioscience* 20, 273-287.
- Wegge P., Odden M., Pokharel C. Pd., Storaas T. 2009. Predator-prey relationships and responses of ungulates. *Biological Conservation*, 189-202.