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Grouping Behaviour and Antler Condition of Chital (*Axis axis*) during Monsoon in MHTR

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Abstract

Study of Group size, age and sex composition of Chital (*Axis axis*) in Mukandra Hills Tiger Reserve (MHTR), India was conducted during mid June 2018 and mid October 2018. Animal behavior is influenced by Group Size and Age-Sex Composition of the Chital herd. Road transects were monitored monthly to gather information on above parameters of Chital in MHTR. Mean group size for Chital was 13.95 ± 3.89 (N=248) during Monsoon in MHTR. Male, female and fawn ratio in MHTR was 43.60: 100: 63.02 (N=3459). Male and fawn influenced group size. Antler condition of Chital in MHTR represents Early Monsoon season as breeding season of the Chital population along with summer. In study area majority of Chital males were seen in hard antlered condition (62.74%) in Monsoon season, whereas some Chital males were seen in velvet (18.77%) and shed (18.49%) antlered conditions.

Key words Stag, Doe, Fawn, Velvet

Introduction-

Chital is a beautiful spotted deer and native of India. It is decreasing in number outside protected areas. Chital is one of the most common and widely distributed cervids in the Indian subcontinent. Chital population is influenced due to human activities in their habitats leading to changes in their grouping behavior (Davey, 2005). Group size and age-sex composition is studied in wild and concluded that Chital is sensitive to environmental changes (De and Spillet, 1966; Pratter, 1934,1971; Barrette,1991; Johnsingh, 1983; Krishnan,1972; Mishra,1982; Miura,1981; Mitra,1986; Raman,1997; Schaller,1967; Sharatchandra and Gadgil,1975; Tak and Lamba,1984). Male Chital (Stag) have a pair of antlers, each composed of a beam forked at the top of which outer one is always large and a brow tine that grow at right angles with the beam. The condition and size of antler is an important parameter in male sexuality (Chandra, 2013). Chital were in different antlered condition during Monsoon (Schaller, 1967; Sankar, 1994). Deer shed their antler every year. Antler condition of Chital reveals internal changes related breeding in stag (Graf and Nicholas, 1966; Raman, 1998; Schaller, 1967; Sankar, 1994; Fuchs, 1977; Johansingh, 1983; Mishra, 1982). Chital antler cycle is influenced by abiotic and biotic factors such as availability of food, photoperiod and rainfall (Raman, 1998).

Study area-

Mukandra Hills Tiger Reserve (MHTR) was notified third Tiger Reserve of Rajasthan during 2013. MHTR includes core area (417.17 square km) and buffer area

(342.82 square km) with a total 759.99 square km area. It is located in the south east part of Rajasthan. Chambal, Ahu and Kalisindh River situated at west, south and east boundary of MHTR. Railway track, National Highway and State Highway runs across MHTR. MHTR is a dry deciduous Forest. MHTR is densely wooded and is spread over a hilly terrain. Mukandra Hills Tiger Reserve is approximately 80 Km in length and 2-5 km in width. It includes mainly Kota District but spread in Jhalawar, Chittorgarh and Bundi District also. It includes Mukandra National Park, Dara Sanctuary, Jawahar Sagar Sanctuary and Chambal Sanctuary. It lies between 24°38' to 25°7' N Latitude and 75°26' to 76°12' E Longitude. It is rich in various wild herbivores and carnivores animals. Some of the resident ungulate species of this mysterious forest are Chital, Sambar, Blue Bull, Chinkara and Wild Boar. MHTR has rich wild life population including carnivores such as Tiger, Leopards, Hyena and Sloth Bears (Nama et. al., 2013).

Materials and Methods-

(1) Group size, age and sex composition of Chital (*Axis axis*) in MHTR was conducted in the Monsoon season, year 2018 in different time intervals. Road transects were monitored monthly to gather information on group size, age and sex composition of Chital in MHTR. Each individual animal age-sex and number of animals in each group were observed and counted when encountered during study. 10-22 x 50 Nikon binocular was used for observations. Group size, age and sex composition were recorded while moving along road transects to record the data on data sheet. All study animals were divided in six categories of age and sex (adapted from Schaller, 1967, and, Mishra, 1982) based on their height, coat colour and presence/condition or absence of antlers i.e.

- i. Adult male: Colour - Darker; Height at shoulder - around 3ft for Chital; antler length - above 1ft when full grown.
- ii. Sub adult male: Colour - lighter; Height at shoulder - around 2½ ft for Chital; antler length - around 1 ft. when fully grown.
- iii. Yearling male: Colour - lighter; Height at shoulder - 2ft for Chital; antler length - around 5 to 6 inches long spike antler for Chital when fully grown.
- iv. Adult female: Colour - lighter; Height at shoulder - 2 ¾ft for Chital; antler absent.
- v. Yearling female: Colour - lighter; Height at shoulder - 2ft for Chital; antler absent.
- vi. Fawn: Colour - lighter; Height at shoulder - around or below mother's chest height for Chital; antler absent.

(2) Antler Phenology of Chital was recorded while moving along road transects and sitting by waterholes with the help of data sheet. Male Chital (Stags) were divided in three categories based on their height, coat colour and presence/condition or absence of antler i.e.

- i. Adult male: Colour - Darker; Height at shoulder - around 3ft for Chital; antler length - above 1ft when full grown.
- ii. Sub adult male: Colour - lighter; Height at shoulder - around 2½ ft for Chital; antler length - around 1 ft. when fully grown.
- iii. Yearling male: Colour - lighter; Height at shoulder - 2ft for Chital; antler length - around 5 to 6 inches long spike antler for Chital when fully grown.

Stags have following Categories depending upon their antler condition whether in hard, velvet or shed.

- (i) Big Antler (More than two feet)
- (ii) Medium Antler (Between one and two feet)
- (iii) Small Antler (Less than one feet)
- (iv) Spike Antler (Up to six inches)
- (v) Shed Antler

Results and discussion-

A total of 248 Chital groups comprising 3459 individuals with a maximum group size of 65 were observed in the MHTR during monsoon season from June to September 2018. Chital in MHTR tends to be in larger groups of 11 to 30 individuals (39.51% of the total groups observed). Chital formed large groups during Monsoon in MHTR. The group size averaged 13.95 ± 3.89 individuals per group. Group size increased from winter to summer (Rajawat, 2018) and Monsoon. In MHTR 1055 were fawns i.e. 31% of the total number of animals observed. Male, female and fawn ratio during monsoon in MHTR was 43.60: 100: 63.02 (N=3459). Higher female sex ratio was probably due to selective male predation by predators in MHTR. Group size in relation to social behavior was observed by Graf and Nicholas (1966), and, Fuchs (1977). Increase in group size in relation to availability of food has been studied by Khan and Vohra, (1992), and, Khan et al. (1995). Group size changes due to increased anthropogenic activities observed by Karanth and Sunquist, (1992), and, Srinivasulu, (2001). Chital group size change temporally and in relation to habitat was observed by Bagchi et al. (2008), and, Ramesh et al. (2012).

Table1. Grouping pattern of Chital during Monsoon in MHTR-

Number of Groups Observed	Number of Animals Observed	Group Size in Percentage					Largest group observed	Mean Group Size	Standard Error of Mean
		1	2-5	6-10	11-30	>30			
248	3459	23	49	55	98	23	65	13.95	3.89

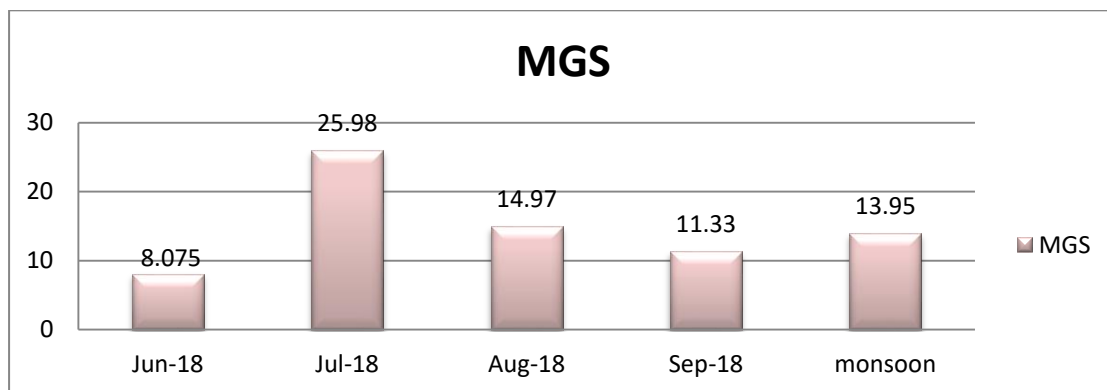


Table2. Sex Ratio of Chital during monsoon in MHTR-

Male	Female	Fawn
43.60	100	63.02

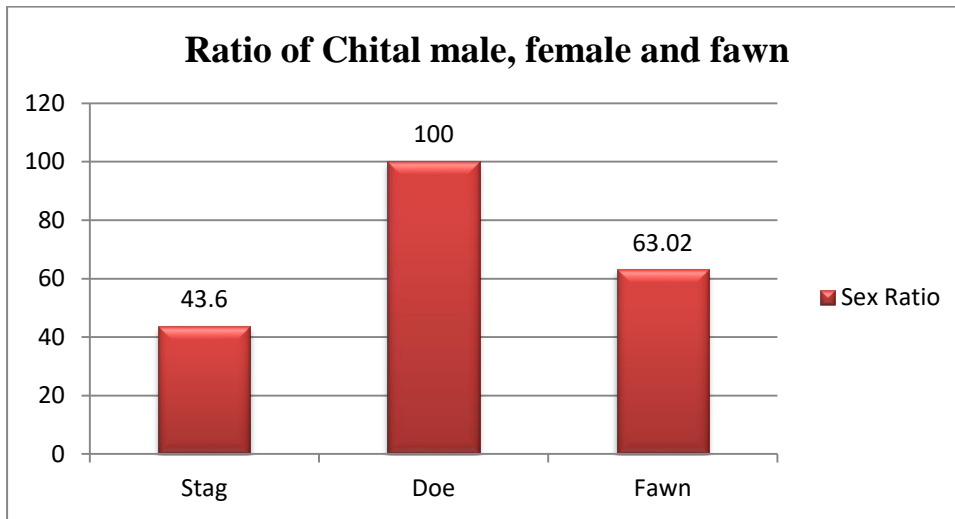


Table3. Percentage of Chital male, female and fawn during monsoon (2018) in MHTR

Male	Female	Fawn
21%	48%	31%

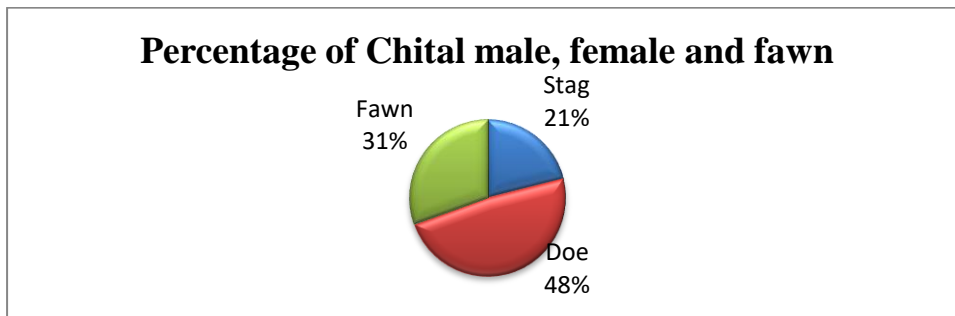
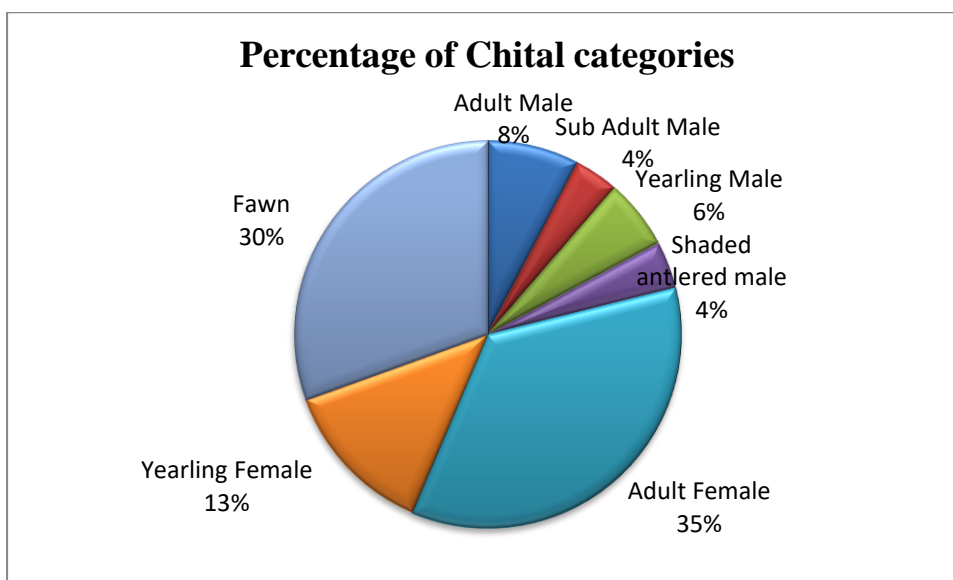


Table4. Age structure of Chital during monsoon (2018) in MHTR-

Adult Male		Sub Adult Male		Yearling Male		Shaded Antlered male		Adult Female		Yearling Female		Fawn		Number of Animal observed
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
265	7.66	128	3.70	202	5.84	135	3.9	1221	35.3	453	13.09	1055	30.5	3459



Overall, a total of 730 male chital were classified in to different age classes. In the study area hard antlered males, velvet antlered males and shaded antlered males occurred in Monsoon season, majority of Chital males were seen in hard antlered condition (62.74%) in Monsoon that indicate the rutting season, whereas 18.77% Chital males were seen in velvet antlered condition. Chital males in shed antlered condition were 18.49% in Monsoon (Table 5). A high percentage of Chital was noticed in hard antlered condition when low fawning was observed. The peak breeding season was summer when majority of the male Chital were observed in hard antlered condition continued in Monsoon (Rajawat, 2018). The peak fawning season observed in winter was supported by breeding season also (Chappel, 1989). The prime aged adult males with big hard antlers involved in most of the conceptions (Raman, 1998). Adult male Chital influenced mean group size as they join female groups during rutting season (Sankar, 1994).

Table5. Antler cycle- hard, velvet and shed antlers observed during Monsoon in MHTR

Hard		Velvet		Shed		N
No.	%	No.	%	No.	%	
458	62.74	135	18.77	137	18.49	730

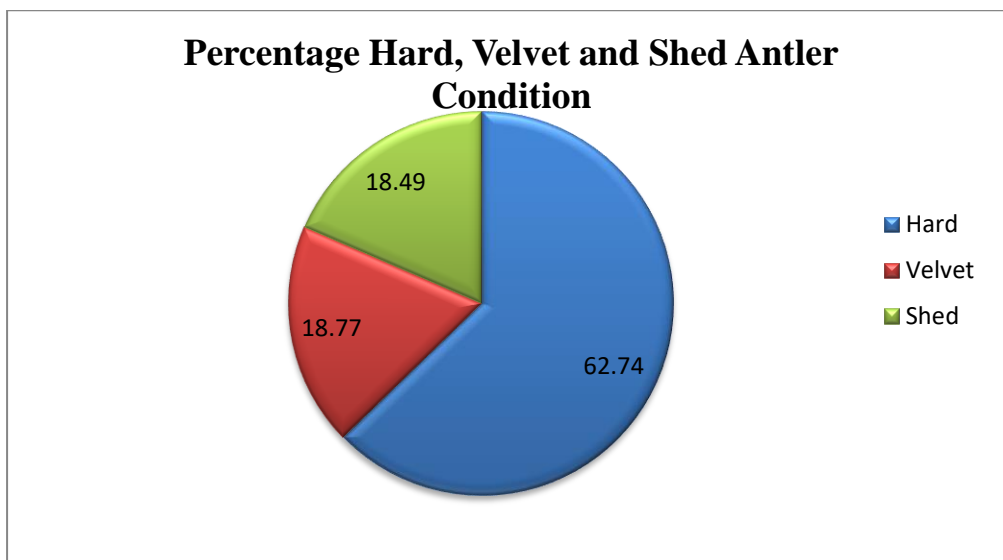
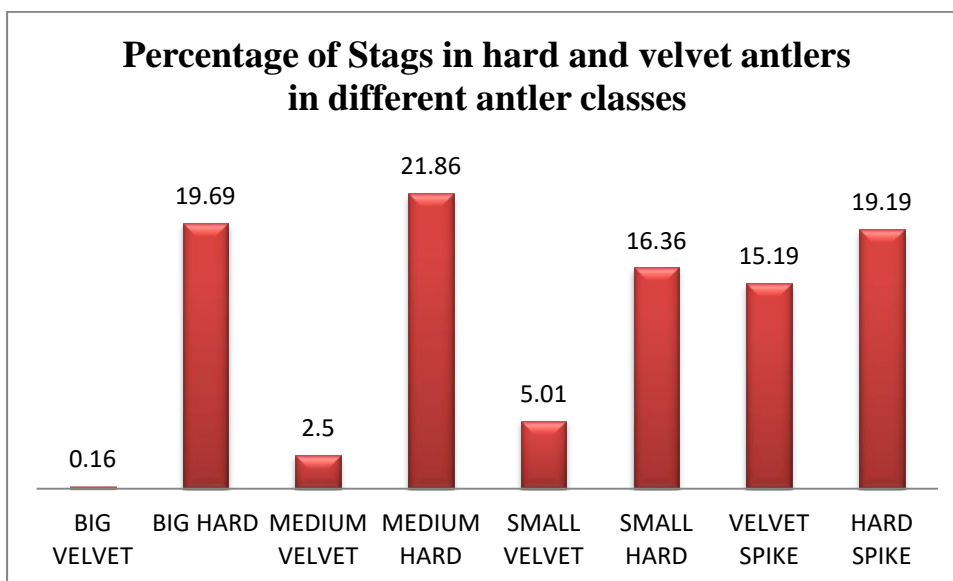


Table6. Percentage of Stags in hard and in velvet antlers in different antler classes during Monsoon in MHTR

> 2 feet		1-2 feet		< 1 feet		Spike		N
Velvet	Hard	Velvet	Hard	Velvet	Hard	Velvet	Hard	
0.16	19.69	2.50	21.86	5.01	16.36	15.19	19.19	599



Hard antlered male are seen during dry hot season and early monsoon which reflects the breeding season as in earlier studies also (Khan, 1992; Graf and Nicholas, 1966; De and Spillet, 1966; Schaller, 1967; Eisenberg and Lockhart, 1972; Johansingh, 1983; Dinerstein, 1980; Sharatchandra and Gadgil, 1975) and some times in winter (Srinivasulu, 2001; Mishra, 1982; Eisenberg and Lockhart, 1972; Chandra, 2013; Prater, 1971). Adult males are more involved in breeding than Sub adult male (Raman, 1998; Ramesh et. al., 2013). Antler shadding occurs mostly in monsoon and winter (Prater, 1971; Ramesh et. al., 2013; Graf and Nicholas, 1966; Schaller, 1967; Eisenberg and Lockhart, 1972; Sharatchandra and Gadgil, 1975; Mishra, 1982) and rarely in summer (Chandra, 2013). Velvet antlered males are common in winter and

early summer (Prater, 1971; Graf and Nicholas, 1966; Schaller, 1967; Sharatchandra and Gadgil, 1975; Mishra, 1982). Most fawning is seen in winter and early summer (Srinivasulu, 2001; Raman et. al, 1996; Raman, 1998; Ramesh et. al., 2013; Tak and Lamba, 1984; Graf and Nicholas, 1966; Schaller, 1967; Sharatchandra and Gadgil, 1975; Mishra, 1982; Johansingh, 1983; Dinerstein, 1980; De and Spillet, 1966; Eisenberg and Lockhart, 1972) and rarely in monsoon (Chandra, 2013). This study enhances knowledge about antler codition and group size relation with environmental factors.

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