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ORIGINAL ARTICLE

Time Activity Budget in Different Age Group of Indian Langur (*Presbytis entellus*) at Goverdhan, Mathura

Devendra Kumar Upadhyay and Ajay Capoor

Department of Zoology, Agra College, Agra

Email: devekumar30@gmail.com

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ABSTRACT

Observations on time budget activity of were taken through the focal and scan sampling for different activities of Indian langur Presbytis entellus at Goverdhan, Mathura, Uttar Pradesh. In addition, six animals were selected for scanning. The sampling illustrated that total time devoted in feeding was 17.49% (24172.80 min) by all six animals (adult dominant male, adult female, sub-adult male, sub-adult female Juvenile and infants) of the group. However, adult female spent maximum time in feeding 24.08% (5548.80 min) as compare to other group members. Total time activity budget of movement showed that all animals spent 17.43% (24099.84 min) time in this activity. Interestingly, adult dominant male spent maximum time 21.40% (4930.56 min) in this activity as compared to other individuals. In motionless behaviour a total of 15.22% (21044.16 min) time was devoted by all animals of the group. However, among group members adult female devoted maximum time 23.46% (5046.72 min.) than other individuals. In addition, mounting was purposefully performed by Presbytis entellus. Time activity budget of this activity showed that total spent time in mounting was 2.25% (3110.40 min) by all animals. This time was recorded minimum of all activities of the group when comparison is drawn among all six animals it indicates that adult dominant male spent maximum time 3.40% (783.36 min) in mounting. Depletion in its number and survival at the study place are its habitat destruction urbanization, pollution and intra specific competition.

Key words: *Semnopithecus, langur, hanuman, monkey, time budget, Presbytis entellus*

INTRODUCTION

Gray langur (*Semnopithecus*) also termed as Indian langur or Asian langur or Hanuman langur. It is the oldest genus of monkey. It has black faced and black feet and is native of Indian subcontinent. They are fairly terrestrial; inhabiting forest, open lightly wooded habitats and also found in urban areas. Mostly they are found at low to moderate altitudes, but the Nepal gray langur and Kashmir gray langur occur up to 4,000 m (13,000 ft) in the Himalayas (Kumar *et al.,* 2008 & Groves and Molur, 2008).

According to Finn, (1929) langur means 'Long tail' in Hindi. It belongs to the largest family cercopithecoidae of infra order catarrhinae. It has two subfamily colobinae and cercopithecinae. Members of colobinae are mostly found in India China and Malaysia, and includes five genera; langurs, douclangurs, snubnosed monkeys, pigtailed langurs and probosis monkeys, because of their leaf diet, these monkeys have been called 'Leaf Monkeys'. Among these, langurs *(Genus Presbytis)* are best known and most diverse of the leaf monkeys of Asia. Only one of belongs to genus Colobus and indigenous of Africa, which was also regarded as God's messengers by certain West African tribes. Moreover, cerceopithecinae includes monkeys which enjoy a more extensive distributed from North Africa in West to Japan in the East, and Northern and Central India.

The first ecological behaviour report on *P. entellus* was published by 'The Bengal Sporting Magazine in August 1836', 'Story of the stronger sex' in which the existence of all male party was highlighted. Similarly, incidental and causal reports about separate male union and its invasion on female groups in Hanuman langur was reported by Hutton (1867), Hughes (1884) and Heape (1894). Perhaps the first leaf monkey pictured in a book in Europe was in a volume by Breydenbach called in translation 'Trip into the promised Land', appeared in 1486. The present study is designed on behavioural aspects *i.e.* time activity budget of Indian langur at Goverdhan, Matura, India.

MATERIALS AND METHODS

The present study was conducted at Goverdhan in district Mathura, Uttar Pradesh. This place is situated at Mathura Varsana Road, 21 km from West of Mathura city on Delhi Mathura National highway and is easily approachable. It is a pilgrim spot visited by thousands of pilgrims and tourists daily. The main study site is a part of forest and adjoining area of greater Goverdhan parikrama path which stretches for about 12km Shri Giriraj ji Goverdhan Mountain which has a length 11 km from North to South and height is 30 meter from land (Ground) is surrounded by parikrama route with a variety of species of both flora and fauna.

All observations were taken with the help of 7 x 50 'Nihon' binoculars during field visits. Whenever, a troop was sighted the number of individuals was directly counted and composition of sex and age classes (adult male, sub-adult male, adult female, juveniles, infants etc.) was recorded. The age classes in case of males were distinguished by the size of canines, colour of ischial pads and visibility of testis and glans penis while in case of female's body size and coat colour size of mammary glands and menstruation were taken as criteria. The animals were selected from different troop for convenience. The adult dominant male, adult female, sub-adult male, sub-adult female Juvenile and infants were identified from a bisexual troop. These observations also included photography of the animals in a variety of postures using a digital camera (20X, 28-140 zoom, 'Sony').

Sampling techniques used for recording the observations were focal and scan, which have been tested on several langurs for obtaining accurate results. These techniques were applied for recording various activities of behaviour of animals by continuously watching the activities of the target animal.

CONSERVATION STATUS

Indian langur is place in the part I of schedule II of the wild life protection act 1971, which prohibits their killing or capture dead or alive. However, enforcement in the field is virtually nonexistent except in the protected areas. Most locals are also unaware of such legal status so this species is fully protected throughout the country Tikader (1983). There is no long term guarantee of the species, survival, unless the habitat is safe guarded.

RESULTS AND DISCUSSION

The total population counted was 55±5 between the initial stages; the variation in number is due to increase in their population during the two year period of study. For a routine focal sampling six animals *i.e.,* 2 males (adult dominant male, sub-adult male) and 2 females (adult female, sub-adult female), a Juvenile and an infant of various age groups were identified. During observations, major categories of behaviour like feeding, movement, motionless, mounting, grooming, reproductive and others activities were studied.

FEEDING:

Generally, adult dominant male langur eats leaves, buds, flower buds, stem tubers fruits. It preferred *Azadirechta indica*, *Ficus religiosa* and their leaves, flowers, fruits and gum. The time activity budget of adult male showed that it spent i.e., 20.58% (4742.4 min) time in feeding (Table 1 & 2). It followed more or less a similar pattern in eating throughout the year. However, sud-adult male was observed to spend 21.75% (5011.2 min) of time as compare to maximum of 23.46% (5046.72 min) for adult female, and also 18.25% (4204.8 min) of sub adult female, 14.41% (3321.6 min) of Juvenile (Table 1 & 2). As far as infant was concern, feeding of the mother's breast is frequent among the black coat infants of up to 4 months of age and then decreases gradually suckling in older infants above 4 months decreases; they may frequently resort to a nipple hold without actual suckling. By the end of second month they often take small twigs, leaves, grass blades or straws in the mouth and run. The time spent in this activity was 5.83% (1344 min) (Table 1 & 2). Similar observations were reported by Newton (1992) and Chalise (1995) on Hanuman langurs (*P. entellus)*, and also by Gupta and Kumar (1992) on Rhesus monkey (*Macaca mulatta*).

MOVEMENT:

The mobile activities of adult dominant male mainly consisted of guarding the territory against intruders (langur of the other group), movements during feeding chasing away younger males and

while retreating for the rest. During the course of studies it was observed that several times animals were forced to move away due to disturbances caused by aggressive monkeys and human beings. The dominant male devoted 21.4% (4930.56 min) time to mobile activities, 18.41% (4243.2 min) for sub-adult male, 19.75% (4550.4 min) for female, 19.60% (4515.48 min) for sub adult female, 16.63% (3832.32 min) for juvenile. In case of infant, second week after birth they can stand on all fours and crawl slowly around the mother in about, third week it begins climbing on the mothers back and shoulders and also showed sign of play behaviour. Play start completely in the second month when the infants begin following one another, come face to face, wristle midly using only the fore arms, spar, roll, clutch at each other and bite. While after the end of month infants jump from an adult female to another, cling the back and sides of female and follow them and undertake frequently chasing, touching, and pushing. The spent time devoted of this behaviour was 8.8% (2027.52 min), (Table 1 & 2). Berries et al., (1999) and Borries and Koenig (2000) also reported similar work on behavioural ecology of *P. entellus*.

MOTIONLESS BEHAVIOUR:

The motionless activities of the langur included standing (alert or relaxed), sitting (alert or relaxed) and lying down. The animal was observed resting usually after morning feed and in the afternoons also. Adult dominant male spent 18.98% (4373.76 min) time in these activities as compare to sub-adult male 20.58% (4742.4 mm), female 15.88% (3659.52 min), sub-adult female 13.71% (3160.32 min), juvenile 9.11% (2100.48 min) and Infant spent 7.03% (1620.43 min) time in motionless behaviour. The animal mostly rested in afternoon in summers while in winters it usually enjoyed the winter sun after the morning feed (Table 1 & 2). The findings of Borries and Koenig (2000) and Johnson and Schaik (2000) also made similar efforts on behavioural ecology of *P. entellus*.

MOUNTING:

This activity depend on seasonal and largely on the temperature factors. The first reaction of the dominant male (on watching a presenting oestrous female) is penile erection and restlessness. With increasing excitement it approaches the female, places his hand (right or left) either on the female's trunk or hindquarters or grasps her legs before mounting. In undisturbed mounting, when a female presents on all fours, the adult dominant male first holds the female's trunk with his forelimbs, than it stands on both the shanks (between ankle and knee) of the female by the help of fingers and soles; this foot-clasp is maintained during mounting. Moreover, adult dominant male devoted only 3.4% (3.36 mm) time in mounting with comparison of sub-adult male 2.21% (510.72 min), female with 3.13% (721.92 min), sub-adult female 2.03% (648.48 min), juvenile 1.63% (376.32 min) and infant spent 1.08% (249.60 min) time in this activity. However, the focal group of animals revealed that adult dominant male spent more time in this activity in comparison to adult female. The observations of Johnson and Schaik (2000) and Koenig (2000) showed corroboration with present research.

GROOMING:

This behaviour is very important for establishing bonds within a social group, it is an important means of tactile communication in which frequent interaction occur either between two or more individuals of the same age and sex or different age and sex. Grooming is of two type *viz.* auto grooming or self grooming and mutual grooming or reciprocal grooming. Auto-grooming is occasional, occurs in all age and sex categories except in very young infants. The frequency of its occurrence varies among various categories of animals *i.e.* sub adult male, adult female, sub-adult females, juveniles. In this process either left or right or both hands are used in manipulating the fur. The body parts most often groomed are the tights, arms, chest, abdomen and tail, and only rarely other parts. One way grooming occurs at any time of the day, but most often after the morning and evening feeds. Mutual grooming occurs between two animals of the same or different age groups and sex which groom each other simultaneously for a short time. The adult dominant male and females groom each other with strongest grooming relationship existing between the adult dominant male and the adult females. This level of grooming interaction among adult langurs showed 14.06% (3240.96 min) time as compare sub adult male 11.83% (2726.4 min), female

24.08% (5548.8 min), sub adult female 15.88% (2880 min), juvenile 9.91% (2284.8 min) and infant 5.56% (1305.60 min), respectively (Table 1 & 2). In this behaviour adult dominant male is often groomed by one to four female at a time. Auto grooming is activity. They were found to be most intense eater throughout the year. When more than one female is in oestrous, simultaneously presentation occurs before the male mate by several females. However, sub adult female showed self grooming like other animals in the focal group except in very young infants. Present findings are complete corroboration with research of Borries (1992) and Borries *et al.,* (1994) on grooming preferences in female langurs (*P. entellus*).

REPRODUCTIVE BEHAVIOUR:

The reproductive activity of adult dominant male mainly involved courting females and chasing them. It also included combating and chasing other male away from the female of its own troop, controlling its troop member and females. However, mounting observed indicates that the animal is very timid and prefers perfect isolation for this activity. The adult dominant male spent 12.1% (2787.84 min) time in reproductive activities as compare sub-adult male 7.76% (1789.44 min), sub-adult female 7.05% (1624.32 min), juvenile 4.25% (979.2 min) with minimum time of infant as 0.55% (126.72 min) (Table 1 & 2). Juveniles and sub-adult females were occasionally observed to crouch or shake head infront of excited dominant male. The observations of Agoramoorthy (1992) and Koenig et al., (1997) on reproductive biology of Hanuman langur *(P. entellus)* showed agreement with the present findings.

OTHER ACTIVITIES:

They include producing sounds produced by different individuals of focal troop; type of sounds, yawning, extra play activities of juveniles and infants. Various sounds are: 'Loud Whoop' calls were given by adult dominant male standing on all fours or running. Front of neck swells during emitting the noise and head was kept up. Whole group was warned by this sound, it may be reciprocated by neighbouring sub-group. Loud barks Hiicheeik-heikhe was produced by adult dominant male sometimes in sitting conditions or with tense watching and moving around, when females aggregate in group. It grunts 'Aaow, aaow in restless and tense sitting to invite attention of other individuals of the troop. On the other hand, coughing sound Kho; Kho was given by adult dominant male in sitting or walking condition to exhibit restlessness, there was no apparent effect on the group while alarm bark, Khiee khiee was given at times and whole group alarmed and runs apruptly to safety. Jumping activity was shown when adult dominant male climbed one tree to other tree. Time devoted by adult dominant male in other activities was 9.46% (2181.12 min), sub adult male 17.43% (4016.64 min), adult female 4.83% (1113.60 min), sub-adult female 26.85% (6186.24 min), juveniles 44.03% (10145.28 min), and highest 71.03% (16366 min) by infant (Table 1 & 2). The observations of Berries et al., (1999) on defence pattern or protection activity of Hanuman langurs *(P. entellus)* in multimale groups given further strength to present findings.

Table 1: Time activity budget in different age group of *Presbytis entellus* (in minutes)

Animal	Feeding behaviour	Movement	Motionless behaviour	Mounting	Grooming	Reproductive/ urinating behaviour	Others
Adult dominant male	4742.40	4930.56	4373.76	783.36	3240.96	2787.84	2181.12
Sub-Adult Male	5011.20	4243.20	4742.40	510 .72	2726.40	1789.44	4016.64
Adult female	5548.80	4550.40	5046.72	721.92	3659.52	2039.40	1113.60
Sub-adult female	4204.80	4515.84	3160.32	468.48	2880.00	1624.32	6186.24
Juvenile	3321.60	3832.32	2100.48	376.32	2284.80	979.20	10145.28
Infant	1344.00	2027.52	1620.48	249.60	1305.60	126.72	16366.00

Table 2: Time activity budget in different age group of *Presbytis entellus* in percentage

Animal	Feeding behaviour	Movement	Motionless behaviour	Mounting	Grooming	Reproductive/ urinating behaviour	Others
Adult dominant male	20.58	21.40	18.98	3.40	14.06	12.10	9.46
Sub-Adult Male	21.75	18.41	20.58	2.21	11.83	7.76	17.43
Adult female	24.08	19.75	23.46	3.13	15.88	885	4.83
Sub-adult female	18.25	19.60	13.71	2.03	12.50	7.05	26.85
Juvenile	14.41	16.63	9.11	1.63	9.91	4.25	44.03
Infant	5.83	8.80	7.03	1.08	5.56	0.55	71.03

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