

Original Research Article

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## A Study on Hanuman Langur (*Semnopithecus entellus*) for Distribution and Demography South-Eastern Rajasthan

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### ABSTRACT

Hanuman Langurs are widely distributed nonhuman primates in India. There are no reports on their status and their distribution in Jhalawar district, Rajasthan, India. Hence, the study was conducted to know their present status and distribution in the region. During the study it was observed that there is a considerable population of the Hanuman Langur with 36 troops constitute 386 langurs of which 82 adult males, 203 adult females, 82 juveniles, and 19 infants. It is observed that the Hanuman langur were recorded at 8 different sites with the mean population of 48.25 (F= 2.65, P= 0.78, P>0.05, Non Significant), Anova result reveals that there was no statistically significant difference in social compositions present among different study sites. Troop size of Hanuman langur was ranges between 03 individuals to 20 with a mean troop size of 10.17 individuals (t-Test:  $\alpha = 0.05$ , P=0.132, P<  $\alpha$ , significant) t-Test result reveals that, there was statistically significant difference in Individuals in Troop and population size. Among the population, Adult female was found to be highest 52.5%, followed by 21.2% was same for Adult male and Juveniles and 4.9% was Infants. In total population size of Hunuman langur age- sex ratio, the estimated adult male and adult female was 82: 203. Again, the Adult Female: Juveniles ratio was 203:82, that of Adult Male: Juveniles ratio was 1:1 and Juveniles: Infants ratio was 82:19.

#### Keywords

Primates, Age-sex ratio, Distribution, Demography, Troops

#### Article Info

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### Introduction

India is rich in the heritage of non-human primates having 17 species and about 30 subspecies. These 17 species are accorded different conservation status (Molur *et al.*, 2003), among them Hanuman Langurs (*Semnopithecus entellus*) with several subspecies are considered as 'least concern' species in IUCN red list categories, CITES Appendix I and schedule II in Wildlife

Protection Act, 1972, since they occupy large area geographically (Fooden, 1980; Prater, 1993) and exploit diverse habitats from dense forests to human-dominated landscape. Such species are usually considered "not at serious risk" (Wolfheime 1983; Choudhury, 1988).

Hanuman Langurs belong to the family Cercopithecidae, subfamily Colobinae are stout and highly adaptable species occurring in wide range of habitats (*Roonwal and*

Mohnot, 1977; Oppenheimer, 1977), the most widely distributed non-human primates in South Asia (Choudhury, 2007; Napier and Napier 1967). They are distributed throughout most of India and Sri Lanka (Ellerman and Morrison-Scott, 1966; Oates et al., 1994) and are also found in parts of Pakistan, Nepal (Oates et al., 1994; Roonwal, 1984), Bhutan and Bangladesh (Choudhury, 2007).

The Hanuman Langur (*Semnopithecus entellus* (Dufresne)(=*Presbytis entellus*) is a common primate found in wide range of habitats from arid regions on the edge of the desert in Rajasthan to the rain forests of Western Ghats and at altitudes of 100–4270 m above Mean Sea Level (MSL) in the Himalayas (Bishop 1978; Hrdy 1977), forests, human habitations that is, cities, villages, roadside, except in north-eastern states (A. Murmu, S. Chaudhuri, P. C. Mazumdar And B. Talukder, 2004) in India, but in Bangladesh they are found only in the open wooded villages and not in forest (Khan & Ahsan, 1981 a; Ahsan, 1984).

The Hanuman Langur is largely a deciduous or dry deciduous forest animal and prefers dry tropical forest, scrub jungles and arid rocky area with xerophytic vegetation. Since the natural habitat of the langur is being eroded at fast pace, its presence near human habitation and religious places is a common sight (Chhangani, 2000).

Different authorities have studied the distribution and behavioral ecology of Hanuman Langurs in India and abroad (Sugiyama, 1964, 1965a, b, 1966, 1967; Sugiyama *et al.*, Oppenheimer, 1977, Roonwal Mohnot, 1977). In Bangladesh Akonda (1976) and Bhuiyan (1977) studied the activity pattern of Rhesus Macaque (*Macaca mulatta*). The troops were categorized into adult male, adult female, juveniles and infants (Southwick et al., 1961 a).

Bonnet Macaques and Hanuman Langurs are widely distributed in the state of Karnataka, probably due to the adaptation to living in a wide variety of habitats from plains to 2100 m as in Western Ghats (Simonds, 1965; Kurup, 1981).

The status and demography of common species have been surveyed in India and there is evidence of negative impacts on their population that might be of concern for wildlife management. In 1961, the census of Hanuman Langur in Dharwar was carried out by Sugiyama (1964). He later found a decline in the number of troops present in the same study sites (Sugiyama and Parthasarathy 1978). Decrease in the population of Hanuman Langurs and rhesus macaque in Shimla (Ross et al., 1993) and West Bengal was due to conversion of forestlands into agricultural fields (Das-Choudhuri and Roy 1989), changes in troop size and decline in population size in bonnet macaques around Mysore (Singh and Rao, 2004) and a sharp decline in primate populations in certain regions of the Western Ghats was due to hunting (Kumara Singh, 2004). Hanuman Langurs largely prefer temples and tourist spots, where they receive handouts from people (Singh and Rao, 2004).

The main objective of the present study was to assess the present status and distribution of Hanuman Langur in Jhalawar, India. As there are no reports of any kind of study on these primates from this area, During the study extensive survey was conducted at almost all the villages, many temples, tourist spots, forests, agricultural fields and horticultural land of Jhalawar district and gathered information.

## **Materials and Methods**

The study on present status and distribution of Hanuman Langur was carried out in the entire district of Jhalawar from July to March 2020

using a two wheeler, between 6.00 a.m. and 11 a.m. and in the afternoon between 3.00p.m and 6.00 p.m. driving the vehicle at 20 km/hr. The troops were categorized into an adult male, adult female, juveniles, and infants. This was recorded by the direct visual method and through informal interaction with people.

Extensive field surveys were performed at 08 different selected study sites in and around Jhalawar in different seasons that were rainy season, winter season and summer season. Each of the 08 selected sites were surveyed individually. Road count methods were used to collect the data about the sites.

Statistical data was analyzed using Excel software. For qualitative data chi-square test and for quantitative data applied ANOVA and t-test was used for statistical significance.

### **Study area**

Jhalawar district is one of the 33 districts of Rajasthan state in western India. Jhalawar was once known as Brijnagar and is a part of Hadoti region and lies at the edge of Malwa plateau. Total 182 species of trees were reported from the Jhalawar. Out of which Dhoklati folia and pendula, Khair, Sagaun, Tendu, Tesu, Neem, Mahua are the major tree species which constitute the most of the canopy cover in the forest of the region

### **For the above study 08 different study sites were selected**

Sun Temple  
Herbal Garden  
Anand Dham  
Khandhiya Lake  
Aamjhar Temple  
Gagron Fort  
Barbela Lake  
Rata Devi Temple

## **Results and Discussion**

### **Distribution of Hanuman Langur**

The study of Hanuman Langurs has not been done so far in Jhalawar region of Rajasthan. Observations on their distribution were carried out at different study sites. Some researchers (Kumar *et al.*, 2010, Kurup, 1981 & 1984, Srinivasulu and Nagulu, 2001, Chouddhury, 2007) mentioned the presence of Hanuman Langurs from other parts of India, but it was limited to their distribution over a small area. Hence, we felt the necessity of this work.

During survey, total 36 troops of Hanuman langur was observed with a mean population size of 128.67 individuals at different selected study sites in different season. The troop locations were plotted in the map of the study area and prepared the distribution map (Figure-1). Study revealed that, various langur troops were distributed in different habitats such as Town area, open forest, Dense forest, Open and moderately dense forest, plantation/cultivation areas in the study area. Among all the troops recorded in the study area, maximum number of troops were recorded from study site-II (Open and moderately dense forest) with 75 number of individuals, while maximum number of individual ie., 76 were recorded at study site - VIII (Open and moderately dense forest) and minimum number of individuals ie., 22 were recorded from study site-IV (Figure-2, Table 1) Ghosh (2009) also counted 501 individuals in 66 groups in Chakrashila Wildlife Sanctuary and its adjacent areas.

According to obtained data of Distribution and social composition of Hanuman langur at different study sites, it is observed that the Hanuman langur were recorded at 8 different sites with the mean population of 48.25 ( $F=2.65$ ,  $P=0.78$ ,  $P>0.05$ , Non Significant),

Anova result reveals that there was no statistically significant difference in social compositions present among different study sites. It is evident that the population of Hanuman langur is not distributed uniformly in Jhalawar. During the study period it was found that the highest number of Langur were recorded from Rata devi temple, while minimum was observed at Khandhiya Lake. A number of Factors are responsible for this fact. It includes the availability of food, tree besides other environmental factors (Figure 3, Table 2) similar study was done by Patil and Modse 2018.

**Troop size and composition in different season**

Troop size of Hanuman langur was ranges between 03 individuals to 20 with a mean

troop size of 10.17 individuals (t – Test:  $\alpha = 0.05$ ,  $P = 0.132$ ,  $P < \alpha$ , significant) t-Test result reveals that, there was statistically significant difference in Individuals in Troop and population size (Table 3, Figure 4). Among the population, mean highest troop size was recorded in winter season (12.27, N= 186), followed by summer season (9.58; N= 115) and monsoon season (8.67; N= 85). Altogether, 15 (48.18%) troops were observed in winter season and 12 (29.70%) in summer season and 9 (22.02%) in monsoon season Mukherjee and Saha (1974) also observed similar types of large troops of 15 individuals only in Rimona forest range of Kokrajhar, where forest villages were exists nearby, but not such large troops had observed by the authors.

**Table.1** Data sheet of number of individuals at different study sites

| Study site                         | Name of site     | Habitat                          | No of individuals |
|------------------------------------|------------------|----------------------------------|-------------------|
| <b>I</b>                           | Sun Temple       | Town area                        | 46                |
| <b>II</b>                          | Herbal Garden    | Open and moderately dense forest | 75                |
| <b>III</b>                         | Anand Dham       | Open forest                      | 48                |
| <b>IV</b>                          | Khandhiya Lake   | Open forest                      | 22                |
| <b>V</b>                           | Aamjhar Temple   | Dense forest                     | 58                |
| <b>VI</b>                          | Gagron Fort      | Open forest                      | 34                |
| <b>VII</b>                         | Barbela Lake     | Open forest                      | 27                |
| <b>VIII</b>                        | Rata Devi Temple | Open and moderately dense forest | 76                |
| <b>Total number of individuals</b> |                  |                                  | <b>386</b>        |

**Table.2** Distribution and social composition of Hanuman langur at different study sites

| Sites  | Adult Males | Adult Females | Juvenile | Infants | Total |
|--|-------------|---------------|----------|---------|-------|
| <b>I</b>   | 9           | 24            | 12       | 1       | 46    |
| <b>II</b>  | 16          | 39            | 18       | 2       | 75    |
| <b>III</b>   | 11          | 22            | 11       | 4       | 48    |
| <b>IV</b>  | 5           | 12            | 2        | 3       | 22    |
| <b>V</b>   | 12          | 32            | 10       | 4       | 58    |
| <b>VI</b>  | 7           | 19            | 7        | 1       | 34    |
| <b>VII</b>   | 7           | 15            | 5        | 1       | 28    |
| <b>VIII</b>  | 15          | 40            | 17       | 3       | 75    |
| <b>Total</b>   | 82          | 203           | 82       | 19      | 386   |
| <b>Mean</b>  | 10.25       | 25.375        | 10.25    | 2.375   | 48.25 |
| <b>SD</b>  | 3.96        | 10.58         | 5.55     | 1.30    |       |
| <b>ANOVA test: F= 2.65, P= 0.78, P value and significance P= 0.78, P&gt; 0.05, Non Significant</b> |             |               |          |         |       |

**Table.3** Showing data sheet of troop size & troop composition in different season

| Season  | Individuals in Troop (Mean) | Troop no | Population    | % of troops |
|---|-----------------------------|----------|---------------|-------------|
| Summer  | 9.58                        | 12       | 115           | 29.70       |
| Monsoon   | 8.67                        | 9        | 85            | 22.02       |
| Winter  | 12.27                       | 15       | 186           | 48.18       |
| <b>Grand Total</b>  | 30.52                       | 36       | 386           | 100         |
| <b>Mean Population</b>  | <b>10.17</b>                |          | <b>128.66</b> |             |
| <b>t – Test : <math>\alpha=0.05</math>, P=0.132, P&lt; <math>\alpha</math>, significant</b> |                             |          |               |             |

**Table.4** Showing distribution and composition of Hanuman langur in different season

| Population  | Summer | Monsoon | Winter | Total |
|---|--------|---------|--------|-------|
| Adult Male  | 25     | 17      | 40     | 82    |
| Adult Female  | 66     | 45      | 92     | 203   |
| Juvenile  | 23     | 20      | 39     | 82    |
| Infant  | 1      | 3       | 15     | 19    |
| <b>Total</b>  | 115    | 85      | 186    | 386   |
| <b>Mean</b>   | 28.75  | 21.25   | 46.5   | 96.5  |
| <b>SD</b>   | 27.11  | 17.48   | 32.46  |       |
| <b>Chi- Square test (<math>X^2</math>): 9.14, Df =6, Critical value =12.59, P&lt;12.59, Significant</b> |        |         |        |       |

**Table.5** Showing percentage of age sex composition of Hanuman langur

| Study sites | Adult males | Adult Female | Juveniles | Infants | Total |
|-------------|-------------|--------------|-----------|---------|-------|
|             | 82          | 203          | 82        | 19      | 386   |
|             | 21.2%       | 52.5%        | 21.2%     | 4.9%    |       |

**Table.6** Showing data sheet of age category and sex ratio

| No. of groups | Adult Male: Adult Female | Adult Female: Juveniles | Adult Male: Juveniles | Juveniles: Infants |
|---------------|--------------------------|-------------------------|-----------------------|--------------------|
| 37            | 82: 203                  | 203:82                  | 1:1                   | 82:19              |

**Fig.1** Map of Jhalawar showing Study cites

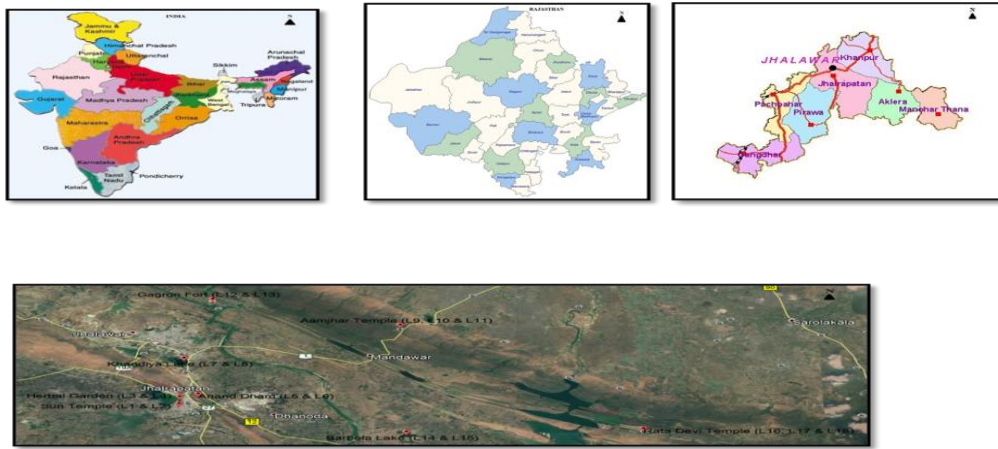
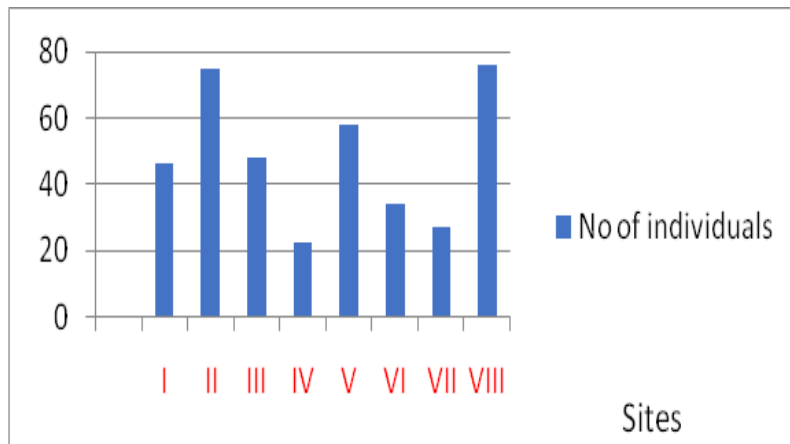
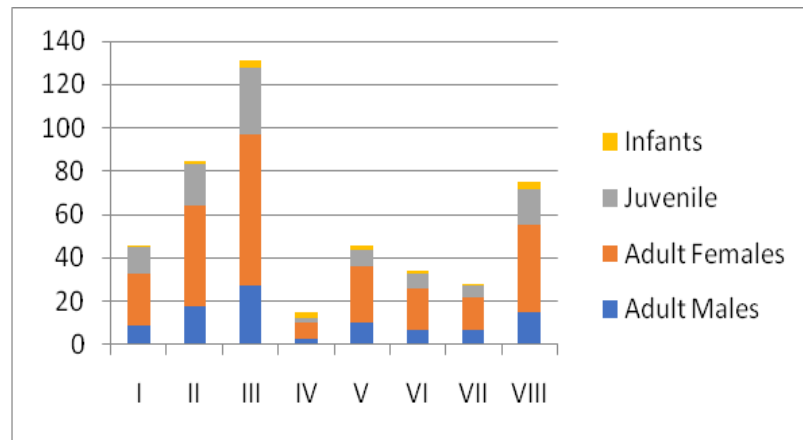


Figure 1: Map of Jhalawar showing Study cites

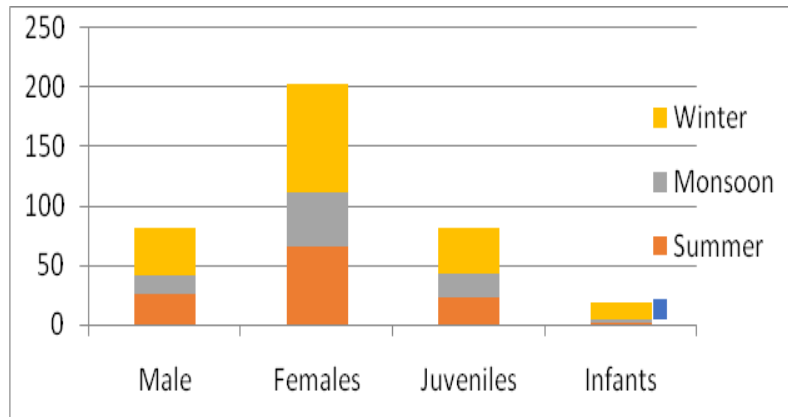
**Fig.2** No. of individuals at different study sites



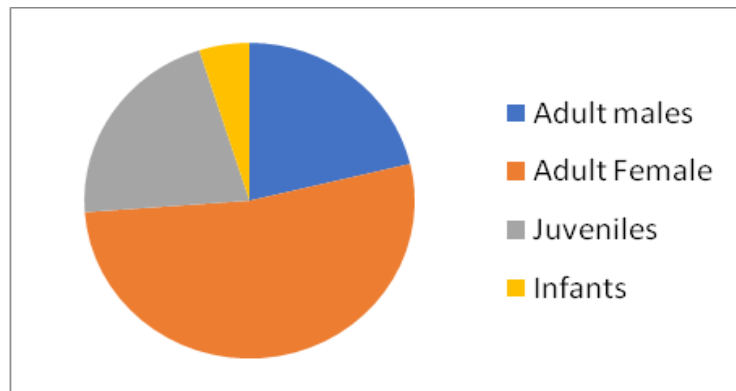
**Fig.3** Distribution of individuals at different study sites



**Fig.4** Distribution of individuals in different season



**Fig.5** Percentage of Age sex composition



**Fig.6** Different groups of langur having different social composition



According to obtained data of Distribution and social composition of Hanuman langur in different season, it is observed that the Hanuman langur with the mean population of 96.5 ( $P < 12.59$ , Significant), Chi- square result reveals that there was statistically significant difference in distribution and social composition of Hanuman langur in different seasons (Table 4). It is evident that the population of Hanuman langur is not distributed uniformly in different season in Jhalawar. During the study period it was found that the highest number of adult male (40), adult female (92), juvenile (39) and infants (15) were recorded in winter season, followed by summer season and least in monsoon season. But in other distribution localities viz. Royal Manas Park etc., the troop sizes were comparatively smaller than present study area (Lehendup *et al.*, 2018; Srivastava *et al.*, 2001b), because such habitats were dense and supported Golden Langur in Kakoijana Reserve forest, Assam.

### **Age sex composition**

Among the population, Adult female was found to be highest 52.5%, followed by 21.2% was same for Adult male and Juveniles and 4.9% was Infants (Table 5; Figure 5). Among all the population of adult males observed at different study sites, highest number of males were recorded at site-III *ie.*, 22.9%, while highest number of adult females 55.8% were observed at study site-6, highest number of juveniles were observed at study site-I with 26.0% and the highest number of infants were recorded at study site IV with 26.0% of infants

### **Age sex ratio**

In total population size of Hunuman langur age- sex ratio, the estimated adult male and adult female was 82: 203. Again, the Adult Female: Juveniles ratio was 203:82, that of

Adult Male: Juveniles ratio was 1:1 and Juveniles: Infants ratio was 82:19 (Fig. 6 and Table 6).

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### **References**

- Akonda, A.W. 1976. Study of population and activity patterns of rhesus monkey *Macaca mulatta* Zimmermann. Unpubl. M.Sc. thesis, Univ. of Dhaka, Dhaka.
- Ahsan, M.F. 1984. Study of primates in Bangladesh: determination of population status and distribution of non-human primates in Bangladesh with emphasis on rhesus monkey. Unpubl. M. Phil. thesis, Univ. of Dhaka, Dhaka. 162 pp.
- A. Murmu, S. Chaudhuri, P. C. Mazumdar and B. Talukder, 2004. A Population Survey of Hanuman Langurs in The District Of Birbhum, West Bengal, India Rec. Zool. Surv. India: 107(Part-1): 109-118, 2007
- Murmu, S. Chaudhuri, P. C. Mazumdar and B. Talukder, 2004. Status of Assamese Macaque, *Macaca Assamensis* in Darjeeling District, West Bengal, India Rec. zoo/. Surv. India: 103 (Part 1-2): 33-41
- Anil Kumar Chhangani, 2002. Group composition and Sex ratio in Hanuman Langurs (*Semnopithecus entellus*) in the Aravali Hills of Rajasthan, India Zoos print journal 17(8):848-852
- Bhuiyan, M.H.K. 1977. Study of population and activity patterns of rhesus monkey *Macaca mulatta* Zimmermann. Unpubl. M.Sc. thesis, Univ. of Dhaka, Dhaka. 99



- pp.
- Bishop, N. H. 1978. Langurs living at high altitudes. *Journal of the Bombay Natural History Society*, 74, 518–520
- Bennett, E. L., and A. G. Davies. 1994. The ecology of Asian colobines. In: *Colobine Monkeys: Their Ecology, Behaviour and Evolution*, A. G. Davies and J. F. Oates (eds.), pp.129–172. Cambridge University Press, Cambridge, UK.
- Choudhury A 1988. Priority ratings for the conservation of Indian Primates. *Oryx* 22:89-94
- Choudhury, A. U. 2007. The eastern limit of distribution of the hanuman langur *Semnopithecus entellus dufresene*. *Journal of the Bombay Natural History Society*, 104, 199–200.
- Chhangani, A. K. 2000. The eco-behavioural diversity of Langurs (*Presbytis entellus*) living in different eco systems Ph.D., thesis JNV University, Jodhpur
- Chalise, M. K. 1995. Comparative study of feeding ecology and behaviour of Honnavalli N. Kumara & Shanthala Kumar & MewaSingh male and female langurs (*Presbytis entellus*). Ph.D. thesis, Tribhuvan University, Kathmandu
- Das-Choudhuri AB, Roy BN 1989. A Preliminary note on the survival status of the Hanuman Langur *Presbytis entellus* in some villages of Nadia District, West Bengal. *J Bombay Nat Hist. Soc* 86:233-235
- Dunbar, R. I. M. 1988. *Primate Social Systems: Studies in Behavioural Adaptation*. Croom Helm, London.
- Doc Adimallaiah, K. Thiyagesan and A. K. Gupta, 2014. Population Status of Phayre's Langur *Trachypithecus phayrei* in Sepahijala Wildlife Sanctuary, Tripura, Northeast India *Primate Conservation* 28: 159-163.
- Fooden J 1980. Classification and distribution of living macaques (*Macaca Lacedped*, 1979), In Lindburg DG (ed) *The Macaques: studies in ecology, behaviour, and evolution*. Van Nostrand Reinhold, New York, p 1-9
- Ellerman, J. R. and Morrison-Scott, T. C. S. 1966. *Checklist of palaeartic and Indian mammals, 1758– 1946* (2nd ed.). London: Trustees of the British Museum (Natural History).
- Hrdy, S. B. 1977. *The langurs of Abu-female and male strategies of reproduction*. Cambridge: Harvard University Press
- H. N. Kumara, Mewa Singh, Shanthala Kumar, and Anindya Sinha, 2010. Distribution, abundance, group size and demography of dark-bellied bonnet macaque *Macaca radiata radiata* in Karnataka, South India, *Current Science*, Vol.99, No.5.
- Honnavalli N. Kumara and Mewa Singh, 2011. Distribution, status and conservation of primates of the Western Ghats (Commissioned Paper)
- Hosur Subbarao Sushma<sup>1</sup>, Rohini Mann<sup>2</sup>, Honnavalli N. Kumara<sup>3</sup> and Arumugam Udhayan<sup>4</sup>, 2014. Population Status of the Endangered Lion-tailed Macaque *Macacasilenus* in Kalakad-Mundanthurai Tiger Reserve, Western Ghats, India *Primate Conservation* (28): 171–178.
- Jay, P. C. 1965. The common langur of north India. In: *Primate Behavior: Field Studies of Monkeys and Apes*, I. DeVore (ed.), pp.197–247. Holt, Rinehart and Winston, New York.
- Kumara, H. N., Kumar, S., & Singh, M. 2010. Of how much concern are the 'least concern' species? Distribution and conservation status of bonnet macaques, rhesus macaques and Hanuman langurs in Karnataka, India. *Primates*, 51, 37 – 42.
- Kurup, G. U. 1981. Report on the census surveys of rural and urban populations of non-human primates of South India. Calicut: Zoological Survey of India.
- Kurup GU 1981. Report on the census

- surveys of rural and urban populations of non-human primates of south India. Man and biosphere programme: Project No. 124. Zoological Survey of India, Calicut.
- Kurup, G. U. 1984. Census survey and population ecology of Hanuman langur, *Presbytis entellus* (Dufresne 1797) in south India. Proceedings of the Indian National Science Academy, 50, 245–256.
- Khan, M.A.R. 1981. The non-human primates of Bangladesh. Tiger Paper. 8(1): 12-15.
- Khan, M.A.R. 1984. Ecology and conservation of the common langur, *Presbytis entellus*, in Bangladesh. In: Current primate researches. (M.L. Roonwal, S.M. Mohnot and N.S. Rathore, eds.), pp. 33-39. Department of Zoology, University of Jodhpur, Jodhpur. Khan
- Kumar HN, Singh M. 2004. Distribution of primates and conservation of *Macacasilenus* in rainforests of the Western Ghats, Karnataka, India. *Int J Primatol* 25:1001-1018
- K. S. Chetan Nag, P. Pramod, K. Praveen Karanth, 2011. Taxonomic Implications of a Field Study of Morphotypes of Hanuman Langurs (*Semnopithecus entellus*) in Peninsular India *International Journal of Primatology*, Volume 32, Issue 4, pp 830–848
- Krishna Kant Tiwari and R. P. Mukherjee, 1992. Population Census of Rhesus Macaque and Hanuman Langur In India- A Status Survey Report Reo. *Zooz. Suftj. India*, 92 (1-4): 349-369.
- Molur S Brandon-Jones D, Dittus W. Eudey A. Kumar A. Singh M, Feroz MM, Chalise M, Priya P, Walker S (2003) Status of South Asian Primates; conservation assessment and management plan (C.A.M.P.) workshop report, 2003, Zoo Outreach Organization/CBSG-South Asia, Coimbatore
- Mohnot, S. M. 1974. Ecology and behaviour of the common Indian langur, *Presbytis entellus*. PhD thesis, University of Jodhpur, Jodhpur.
- Mohammed Asif and Sanjeevareddy Modse, 2016. The distribution Pattern and population of Blackbuck Antelope *Cervicappa Linnaeus* in Bidar, Karnataka, *Indian Forester*, 141(10); 965-970.
- Napier, J. R., & Napier, P. H. (1967). A handbook of living primates. London: Academic Press.
- Oppenheimer, J.R, 1977. *Presbytis entellus*, the Hanuman langur. In: Rainer, H.S.H. and Bourne, G.H. (eds.): *Primate Conservation*. Academic Press, New York, 469-512.
- Oates, J. F., Davies, A. G., and Delson, E. 1994. The diversity of living colobines. In A. G. Davies and J. F. Oates (Eds.), *Colobine monkeys: Their ecology, behaviour, and evolution* (pp. 45–73). Cambridge: Cambridge University Press.
- Prater SH 1993. *The Book of Indian animals*, 4th impression. Bombay Natural History Society, India, Bombay.
- Roonwal, M. L. and S. M. Mohnot. 1977. *Primates of South Asia: Ecology, Sociobiology, and Behaviour*. Harvard University Press, Cambridge, Massachusetts
- Roonwal, M. L. 1984. Tail form and carriage in Asian and other primates, and their behavioral and evolutionary significance. In M. L. Roonwal, S. M. Mohnot, and N. S. Rathore (Eds.), *Current primate research* (pp. 93–151). Jodhpur, India: Jodhpur University Press.
- Rajpurohit, L. S. 1987. Male social organisation in Hanuman langur (*Presbytis entellus*). PhD thesis, University of Jodhpur, Jodhpur.
- Rajpurohit, L. S. and V. Sommer. 1993. Juvenile male emigration from natal one-male troops in Hanuman langurs. In: *Juvenile Primates: Life History*,

- Development, and Behavior, M. E. Pereira and L. A. Fairbanks (eds.), pp.86–103. Oxford University Press, New York.
- Ross C. Srivastava A. Pirta RS, 1993 Human influences on the population density of hanuman *Langurus Presbytis entellus* and rhesus macaques *Macaca mulatta* in Shimla, India. *BiolConserva* 65:159-163.
- Schuelke, O. 1998. Bachelors and harem males: A comparison of feeding and ranging behaviour in adult langur males (*Presbytis entellus*) at Jodhpur Rajasthan, India. *Folia Primatol.* 69(4): 220. (Abstract)
- Sing M, Rao N, 2004. Population dynamics and conservation of commensal bonnet macaques, *Int J Primatol* 25:847-859.
- Simonds PE 1965. The bonnet macaque in south India. In: De Vore I (ed.) *Primate Behaviour: field studies of monkeys and apes*. Winehart and Winston, New York, Holt, pp 175-196
- Southwick, C.H. and Siddiqi, M.R. 1968. Population trends of rhesus monkeys in villages and towns of northern India from 1959 to 1965. *J. Anim. Ecol.* 37: 199-204.
- Southwick, C.H. and Siddiqi, M.R. 1961a. Population survey of rhesus monkeys northern India: II Transportation routes and forest areas 1959 to 1965. *J. Ecol.* 42: 698-710.
- Srivastava, A. 1989. Feeding ecology and behaviour of Hanuman langur, *Presbytis entellus*. PhD Thesis. University of Jodhpur, Jodhpur.
- Srinivasulu, C., and Nagulu, V. 2001. Status of primates in Andhra Pradesh. *Envis Bulletin: Wildlife and Protected Areas*, 1(1), 109–112.
- Sugiyama, Y. 1964. Group composition, population density and some sociological observations of hanuman langurs (*Presbytis entellus*). *Primates* 5: 7-37.
- Sugiyama Y, Parthasarathy M D, 1978. Population change of the Hanuman langur (*presbytis entellus*), 1961-1976, in Dharwar area, India. I. *Bombay Nat Hist Soc* 75:860-867
- Sugiyama, Y., K. Yoshiba and M. D. Parthasarathy. 1965. Home range, mating season, male group and intertroop relations in hanuman langurs (*Presbytis entellus*). *Primates* 6: 73–106.
- Sugiyama, Y. 1966. An artificial social change in a hanuman langur troop (*Presbytis entellus*). *Primates* 7: 41-72.
- Sugiyama, Y. 1967. The social organisation of hanuman langurs. In: *Social communication among primates* (S.A. Altmann, ed.), pp. 221-236. The Chicago University Press, Chicago.
- Vogel, C. 1971. Behavioural differences of *Presbytis entellus* in two different habitats. In: *Proceedings of the Third International Congress of Primatology*, Vol. 3. Behaviour, H. Kummer (ed.), pp.41–47. S. Karger, Basel
- Wolfheime JH 1983. *Primates of the world. Distribution, abundance, and conservation*. University of Washington Press, Seattle.
- Yuimaru Sugiyama, M.D. Parthasarathy a brief account of the social life of hanuman langurs *Proc. Natn. Inst. Sci, India*. Vol, 35. B Plate. XXI.

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