



Research Article

DO ALPHA MALE HANUMAN LANGURS DEFEND THE INFANT/ JUVENILE OF THEIR TROOPS?

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ABSTRACT

A study on a resident male and infant relationship in a bisexual troop of Hanuman langur (*Semnopithecus entellus*) around Jodhpur, Western Rajasthan, is conducted during 2017-18. The study troop Kaga North (B-11) had three males, including resident males. There were 18 adult females, 22 infants, and juveniles in this troop. Many of the time, the alpha (resident) male observed more aggressive towards other adult males available in the troop, but he never harms to male juveniles and infants. Although there were sub-adult males also in the troop, resident never attacked them. On the other hand, a beta male was attacked by a resident in several cases. Sometimes the resident showed his neutral behavior towards infants. But other times, it was observed when the resident showed positive responses towards infants and juveniles. Other males also showed protective behavior towards them. No incident of infanticide has found, and no resident male change took place during the study period. The study supported the prediction derived from the selection hypothesis, i.e., the new dominating male may allow the male juvenile and sub-adult males to stay in the same uni-male bisexual troop leading to the multi-male situation. The resident male is quite likely to face much competition over resources, particularly receptive females. Still, he may get additional advantage from those fellow and or rival males in cooperative defense against conspecifics and predators, thereby increasing reproductive success. The study further supports that the resident shows his positive response for infants and also for sub-adult males while feeding, playing, and resting.

Keywords: Hanuman langurs, Infant, Troop, Defend, Kin relation.

INTRODUCTION

When females mate with multiple male partners, paternal care is generally expected to be negligible. Because it may be hard or impossible for males to classify their offspring from those of other males, and because appealing in paternal care may reduce male mating opportunities. In a multimale primate society (*Semnopithecus entellus*), males deliver care to the infant in the form of constant support during agonistic encounters. Male dependent also practiced accelerated maturation if their father existed during their immature period. A present study specifies a straight effect of paternal presence on offspring fitness. This affiliation, in turn, suggests that the multiple roles that males play in multimale animal societies have not been sufficiently examined or appreciated. That protective effect may be more persistent. Paternal investment, however, should evolve if it gains offspring survival rates if it does not severely reduce the chance to mate with other females, and

if paternal certainty is high (Mohnot, 1971; Perrone Jr & Zaret, 1979). Therefore, protective care in mammals is generally, but not universally, associated with monogamy (Kleiman & Malcolm, 1981). Male care of infants/juveniles is more common in primates than in most mammals (Kleiman & Malcolm, 1981). But is attributed to mating effort, i.e., to an attempt to start the juvenile's mother to mate rather than to paternal care (Van Schaik & Paul, 1996). This behavior is particularly typical in the case of multimale primate societies, in which females mate with several males, and males repeatedly disperse among social groups.

Although rare, paternal care in a few primate species and some human societies includes providing protection from predators and other conspecifics, sharing food, playing, grooming, and carrying infants. Paternal care is a complement of behaviors performed by a mature male (the supposed/social father of the immature young), which

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would not act in the absence of the young. These activities are directed to the infant and have an optimistic effect on infant development, growth, well-being, or survival. They may include carrying, grooming, playing, sharing food, feeding, retrieving, huddling, babysitting, and defending.

In most non-human primates, males may be easy-going of infants, or they may occasionally cooperate affiliative with them without any evident direct or indirect care provided (Wrangham & Struhsaker, 1987). The most convincing evidence for the benefits that infants may accrue from these infrequent interactions with males comes from studies of baboons (*Papio cynocephalus*). Adult males selectively care about their progeny in agonistic disputes with a direct outcome on the offspring fitness (Buchan *et al.*, 2003; Charpentier *et al.*, 2008). The hypothesis reflects the affiliative interactions between males and infants as a mating strategy by males that helps them develop a relationship with a female and secure a position in the more extensive social network. The hypothesis has been useful to examine male infant interactions in some taxa where there is no evident and straight care (Smuts & Gubernick, 1992) and more recently, in humans (Marlowe, 2000). Other nonattachment relationships among group members are friendly (with the close following, food sharing, play, and passive contact). Studies in multimale non-human primate groups presented that sires enhance food access for progeny and make available defense in conflicts.

Suggestion for care provided by adult alpha males mostly comes from monogamous species and those with one-male units, where paternity certainty is high. In these species, adult males (often the sire of an infant) predominantly contribute to infant care by carrying the young (Fernandez Duque, 2009). A traditional view of multi-male non-human primate groups has held that males offer relatively slight direct care to juveniles, possibly as a result of low confidence of paternity associated with a relatively promiscuous breeding system (Sharma, 2007). Comparative bonding in primates has given little attention to the difference in the intensity and type of male care system within the set of species that have multi-male social network. Among multi-male society, male care of a young infant is reported most often in Barbary macaque (*Macaca Sylvanus*), and chimpanzee (*Pan troglodytes*) and vervet monkey (*Cercopithecus aethiops*) (Langos *et al.*, 2013). This inter specific variance may result from difference in the importance of male care to infant survival and another male confidence of paternity (Díaz Muñoz, 2011; Langos *et al.*, 2013).

MATERIALS AND METHODS

It has often noted that female primates have a habit of having prolonged mating periods in their ovarian cycles, tend to mate polyandrous and also tend to mate during pregnancy (Hrdy, 1979; Rajpurohit, 1987; Goutam Sharma *et al.*, 2010; Sommer & Rajpurohit, 1989; Wrangham & Struhsaker, 1987). Since females in species susceptible to infanticide illustration these features to a more excellent range, this behavior was understood as serving to confuse

paternity (Van Schaik, 2000; van Schaik *et al.*, 1999). Thus, in polygamous organisms, male infant is usually dependent on their mother for longer and make more demands on maternal resources, so that adult males tend to be larger and stronger, tolerating them to seek out and participate for mates efficiently (Clutton Brock, 1991; Collins *et al.*, 1984; Robert, 1972). Studies so far have attentive mainly on broad sex variances in migration and risk-taking, and mortality rates (Clutton Brock, 1991; Smuts & Gubernick, 1992; van Noordwijk & van Schaik, 2004). Especially in long-lived primates, a male's success in competing for mates and protecting his offspring must be affected by the nature of vital social decisions, such as whether and when to transfer to other groups or task dominants. Some studies specify the necessity of male decisions about transfer and achievement of rank on age and local demography (Sprague *et al.*, 1998; Watts, 2000).

Furthermost in mammalian males do not offer care for infants and, if present at all after conception, associate and cooperate with immatures only infrequently (Van Schaik & Kappeler, 1997). The shortage of male care for descendants has been described by the high costs of missed mating prospects and by a high degree of paternity uncertainty in polygynandrous mating arrangements (Clutton Brock, 1991; Van Schaik & Paul, 1996). In non-human primates, especially in the cercopithecine subfamily, males and females are related year-round. They typically live in polygynandrous multimale groups (Collins *et al.*, 1984); males and immatures infants have generally found in close spatial connotation and affiliative or caring collaboration (Maestriperi, 1998).

RESULTS AND DISCUSSION

The present study on Hanuman langurs shows that in multi-male bisexual troop resident shows his interest and paternity towards infants and juveniles. The one and a half years of research on this multi-male bisexual troop Kaga North (B-11) had three males, including resident males. There were 18 adult females, 22 infants, and juveniles in this troop have conducted during 2017-18. Ten eye-witnessed on infants by males were studied in connection with male residency, paternity, and sexual behavior. Adult males played a significant role in infant defense (60%) in a multi-male bisexual troop. Both the genetic father and other males (living in the troop) observed some protecting and neutral behavior in a troop. But in most instances, it seems that the males took only copulations with possibly fertile females but not with pregnant females as clues for paternity. It seems likely that the danger of infanticide is a important factor in female-male relations, even in primate multimale groups.

Throughout the 18-month study period, data were collected almost daily using 30-min focal animal sampling (Altmann, 2001). We followed all ten immatures born in 2017-18. All data recorded all social behaviors (agonistic and affiliative) and male-immature relationship to measure frequencies and durations. At 5-min intervals, recorded the identities of the focal group.

For the analysis of differentiation and relationship maintenance included only social interactions that derived from individual approaches, ignorance, departures (within 2 m, i.e., proximity) of the infant themselves to/from males.

Table 1. Adult male- Infant Interaction (cooperation/tolerance) in focal troops during 2017-2018.

Focal Infant	Sex	No of dyads				
		Ignore the-young animal whereas it feeds with him	Allow the young animal to precede him when feeding	Allow an infant or juvenile to touch or climb on him,	Not react when a young animal pesters him during copulation	Tolerate a dominance demonstration from an infant or juvenile without vengeance
11	Male	25	27	31	23	11
12	Male	26	22	34	31	8
13	Male	28	29	22	25	18
14	Female	27	22	47	49	20
15	Male	26	29	19	21	11
16	Female	32	33	31	41	23
17	Female	35	37	28	46	27
18	Male	21	26	18	24	26
19	Male	21	27	25	23	17
20	Female	33	39	35	29	10
Total		274	291	290	312	171
Mean		27.4	29.1	29	31.2	17.1
Variance		20.24	29.49	68	96.56	42.89
SD		4.4988875	5.43047	8.246211	9.826495	6.549046

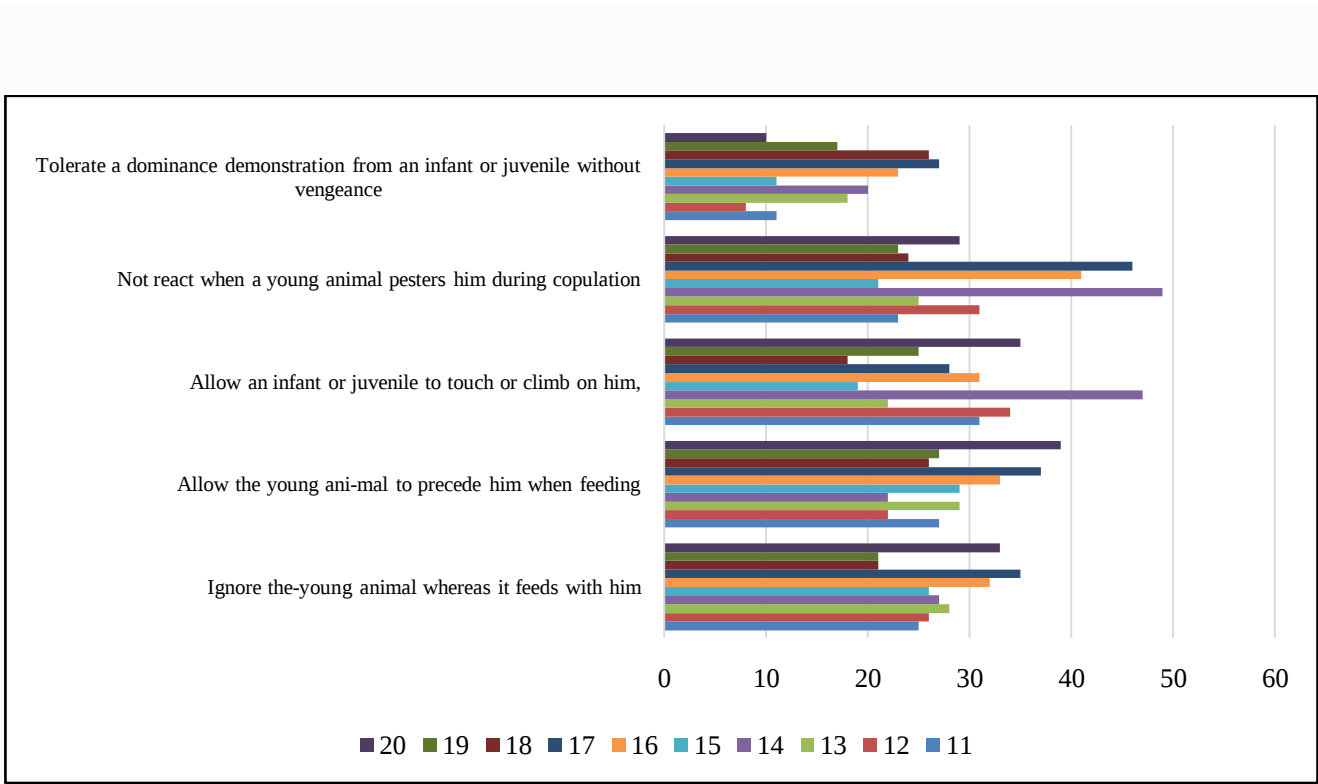


Figure 1. Adult male-infant interaction (cooperation/tolerance) in focal troops during 2017-2018.

The study calculated for each adult male-immature dyad based on constant focal sampling accounts to determine the quality of the association between males and infants in the study group. It was corrected male-infant dyadic focal time for the time the dyad core sided in the same group. The study contains the relation and strength of an affiliative bonding based on the frequency (f) and duration (d) of close spatial proximity of 2 m (P) and body contact (B). Grooming was infrequent in the study. Data on different aspects were recorded when male-infant interaction found very interesting. (1) Ignore the-young animal whereas it feeds with him, (2) Allow the young animal to precede him when feeding, (3) Allow an infant or juvenile to touch or climb on him, (4) Not react when a young animal pesters him during copulation, (5) Tolerate a dominance demonstration from an infant or juvenile without vengeance (table 1). The study further supports that the resident shows his positive response for infants and also for sub-adult males while feeding, playing, and resting. At the time of daily activity, it has observed that the resident was showing indirect care (protection) towards infants. At the time of playing activities of the infant's resident male showed a positive response. Although there was no incident of taking and carrying the infants was seen in the field, but the resident never objected to them and allowed sitting near. We illustrate that the father's existence in the immature's social group during the offspring's juvenile period enhanced the timing of functional maturation in female infants.

Hypotheses about the evolution of sociability and association in primates are based on ecological descriptions as well as on social aspects such as conspecific risk (especially infanticide by outsider males). The social explanation fits well with the conditions found in primates living in one-male groups mainly occurs when the alpha male (guardian) has replaced. However, whether it likewise fits the circumstances in multimale groups will depend on the role of resident males as infant protectors. Paternity misperception may be so operative in Assamese macaques (Fürtbauer *et al.*, 2011) that infanticide from within the group is infrequent. In the present study, the risk of infanticide by outsider males was zero because no adult males immigrated during the study period or the preceding six months. In rhesus macaques, only genetic sires, but not nonsires, affiliate more with immatures during infancy, i.e., when the vulnerability is high, compared to later juvenility (Boesch *et al.*, 2006; Langos *et al.*, 2013). Forecasts derived from the anti-harassment hypothesis of paternal care were moderately met. The time Infant/immature spent in immediacy to preferred males was comparatively constant during the study period. The existence of the favorite male in the familiarity of an infant did not reduce the prospect of getting aggression from any group member, because the sometimes males represented hostilely counter to the immatures. Even after excluding interactions between the immature and its preferred male, we did not find support for reduced aggression received, submission is has given, or assault provided by immatures. Males that are less

hostile on the way to their genetic offspring compared to dissimilar immatures (Boesch *et al.*, 2006).

Infant mortality is relatively high in wild non-human primate's species, as it is in other wild mammals (Díaz Muñoz, 2011). In long-lived species like primates, lifetime fitness will generally be considerably more sensitive to existence than to fertility (Brault & Caswell, 1993; Caswell, 1989; McDonald, 1993; Wisdom *et al.*, 2000). Changes in survival, as well as survival during infancy and the juvenile period, may account for; 90% of the total sensitivity of fitness in long-lived species (McDonald, 1993). If selection on infant existence is strong and male primates are known to invest in immatures, why is it so commonly believed that male primates do not deliver paternal attention? A key reason has been the difficulty of linking male care to genetically determined paternity. Recently have genetic paternity tests been supported out in wild primates; the very few that have inspected male-immature relationships in the light of paternity results have found mixed but convincing evidence (Buchan *et al.*, 2003; Huchard *et al.*, 2010; Kuester & Paul, 1992; Maestripieri, 1998).

Data in most natural primate populations has led some to propose that male care is more likely to characterize mating investment than parental responsibility. That is, males care for offspring as a mating inducement to mothers (Van Schaik & Paul, 1996). Another possible purpose that paternal care has overlooked in primates is that the most visible forms of parental care, provisioning, and carrying are uncommon behaviors among male primates. But, other arrangements of parental responsibility, including grooming, defending, playing, and providing a safe zone for feeding and resting, maybe quite crucial for infant welfare (Kleiman & Malcolm, 1981) and are usually performed by male primates (Altmann, 2001; Brandt *et al.*, 1970; Collins *et al.*, 1984; Huchard *et al.*, 2010; Langos *et al.*, 2013; Wrangham & Struhsaker, 1987). Females can advantage from paternity confusion in multimale groups when their infants are defenseless to infanticide by creating a set of males who are potential caretakers of their infants. Paternity confusion is unlikely to lower the risk of an infanticidal attack because infanticidal males are typically new immigrant males that have recently attained a position of high reproductive activity in a group (Boggess, 1984; Collins *et al.*, 1984; Crockett, 2000; Fossey, 1984; Leland, 1984; Steenbeek, 2000; Wisdom *et al.*, 2000).

Studies of primates living in multimale groups provide a mixed suggestion for the paternal care hypothesis. For genuine protective care to evolve, males need to accurately distinguish their offspring from other infants (Altmann, 2001). In species males may measure paternity prospect based on their own mating behavior, association history with the infant's mother, and perhaps phenotype matching (Boesch *et al.*, 2006; Buchan *et al.*, 2003; Maestripieri, 1998; Van Schaik, 2000).

CONCLUSION

The study supported the predication derived from the selection hypothesis, i.e., a new dominating male may allow the male juvenile and sub-adult males to stay in the same uni-male bisexual troop leading to the multi-male situation. The resident male is quite likely to face much competition over resources, particularly receptive females. Still, he may get additional advantage from those fellow and or rival males in cooperative defense against co specific and predators, thereby increasing reproductive success. The male with the highest affection was classified. This study did not provide clear evidence in support of the anti-infanticide hypothesis of paternal care. The degree of variation in Infant-male relationships follows regular changes in the risk of infanticide at a young age. The entire time the preferred male spent around the immature increased instead of decreased after 6-7 months of age, i.e., after the period of maximum infanticide risk, and then remained stable until the end of our study period. The current study supported the mating effort hypothesis for the development of male care proposes. Male-infant/immature relations grown as a form of vigorous mating effort rather than paternal determination, with the male engaging himself to the female langur to improve his future mating success with her.

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