



Study on the animal behaviour of *Macaca mulatta*, *Macaca silenus*, *Selenarctos thibetanus* and *Melursus ursinus* at Sanjay Gandhi Biological Park, Patna

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Abstract : A study was conducted on the behaviour of *Macaca mulatta*, *Macaca silenus*, *Selenarctos thibetanus* and *Melursus ursinus* for 16 days in the month of September, 2011 at Sanjay Gandhi Biological Park, Patna. Abnormal behaviour such as stereotypic nodding was observed in both *Selenarctos thibetanus* and *Melurus ursinus*. *Macaca mulatta* and *Macaca silenus* also showed abnormal behaviours such as stereotypic

pacings, self – biting and hair plucking. The factors influencing the exhibition of abnormal behaviours were indentified to be group composition and size, enclosure design and increasing number of visitors.

Keywords : Behaviour, visitors, time interval, enclosure type.

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Introduction :

Animal behaviour is the response of animal towards the external stimuli or environmental factors which are interwoven with life and the responses of the living organism with them. Behaviour of species should be best studied in the wild, but often watching is difficult, especially for human-shy species. On the other hand, animal under captive condition can be the object of organised studies though captive environment restricts the animal biologically and spatially, from performing its species-specific natural behaviour. Being unable to adapt to the artificial surrounding they develop a specific abnormal behaviour under captive condition. Lion-tailed monkey and Rhesus monkey are diurnal, arboreal and terrestrial quadruped animals which feed on fruits, cereals,

seeds, roots etc. In natural habitat, they spend maximum time in feeding and foraging. Sloth bear and Himalayan bear are nocturnal animals which feed on fruits, honey, insects, termites, beetle larve, carrot etc but in captive condition they develop abnormal behaviour. Several environmental factors influence the behaviour of primates in zoos, one of these being enclosure space. It has been observed that non-human primates housed in barren cages with hard substrate exhibit high levels of abnormal behaviour and lower level of active behaviour compared to individuals housed in complex open – moated enclosure with soft substrate which shows high level of active behaviour and low level of abnormal behaviour (Mallapur and Choudhary 2005). Housing animals singly or in group compositions that are inappropriate for the species, results in a reduction in exploratory and social behaviour and also stimulates an exhibition of abnormality (Anderson and Chamove 1980). Behaviour of adult animals in captivity is also affected by the loud noise of visitors which increases with increasing number of visitors and this correlates with increased vigilance behaviour in orangutans (Brike 2002). Zoo-housed primates direct more behaviour at active audiences (Mitchell et al 1992) and show greater overall activity when visitors are more (Chamove et al 1988; Hosey and Druck 1987; Mitchell et al 1992).

In this paper, we have observed different behaviours of two species each of Cercopithecidae and Ursidae in captivity and factors which influences the exhibition of abnormal behaviours such as group size and composition, enclosure type, enclosure complexity, enclosure substrate, number and behaviour of visitors etc.

Material and Methods :

Subjects and housing : The behaviour of the two species of Ursidae (*Melursus ursinus* and *Selenarctos thibetanus*) and Cercopithecidae (*Macaca silenus* and *Macaca mulatta*) at Sanjay Gandhi Biological Park, Patna was observed.

They were housed with diverse group sizes and composition in different enclosure types, which varied in their degree of complexity (Table 1 and 2)

Behavioural and Analytical Method:

Behaviours of Ursidae (sloth bear and Himalayan bear) and Cercopithecidae (Lion-tailed monkey and Rhesus Monkey) were observed for 8 hours from 7:15 A.M to 5:15 P.M and recorded at every 15 minute interval. Their behaviours were categorized as active, resting and abnormal behaviour (Table 3 and 4).

The parameters selected for studying the external factors affecting the captive animals are close proximity to humans, visitor’s noise and number. The internal factors include enclosure size, enclosure type and enclosure substrate.

Statistical analysis was done with help of Pearson’s correlation.

Table 1. Factors categories used to compare behavioural data of Ursidae

GROUP SIZE AND COMPOSITION

<i>Melursus ursinus</i>	<i>Selenarctos thibetanus</i>
2 adult males kept in the same enclosure provided with natural features without their young ones.	3 adult males kept in the same enclosure provided with natural features without their young ones.
Approximate area = 3000m ²	Approximate area = 3000m ²

ENCLOSURE TYPE

Wet Enclosure: Enclosure with a ditch on one side containing water.
Barren but Enriched Enclosure : Enclosure provided with structural features such as bamboo shed, shower and a circular cemented structure.
Complex Enclosure: Enclosure possessing several natural features such as trees, grass, logs of wood

Table 2. Factors categories used to compare behavioural data of Cercopithecidae.

GROUP SIZE AND COMPOSITION

<i>Macaca silenus</i>	<i>Macaca mulatta</i>
Male and female in the ratio 1:1 kept in the same enclosure provided with natural habitat.	Males and females in the ratio 12:9 kept in separate enclosures without natural habitat.
Approximate area = 3500m ²	Approximate area= 344m ²

ENCLOSURE TYPE

Wet moated enclosure: enclosure surrounded by a moat containing water	Cage: net cage provided with ropes and trees.
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ENCLOSURE COMPLEXITY

Enclosure with soft substrate such as grass, soil and trees.	Enclosure with hard substrate like concrete.
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Table 3. Behaviour exhibited by captive Ursidae

URSIDAE (<i>Melursus ursinus</i> and <i>Selenarctos thibetanus</i>)
ACTIVE BEHAVIOUR
Walking, foraging, feeding, digging and playing
ABNORMAL BEHAVIOUR
Stereotypic nodding: Moving head repetitively.
RESTING BEHAVIOUR
Bathing, Sleeping and Sitting

Table 4. Behaviour Exhibited by Captive Cercopithecidae

CERCOPITHECIDAE (<i>Macaca silenus</i> and <i>Macaca mulatta</i>)
ACTIVE BEHAVIOUR
Walking, scratching, feeding, drinking, aggression and foraging
ABNORMAL BEHAVIOUR
Stereotypic pacing: Moving along the same path repetitively.
Hair-plucking : plucking one's own hair
Self – biting: biting oneself
RESTING BEHAVIOUR:
Sitting

Results and Discussion :

On an average, a captive adult Sloth bear performs 0.8% of 8 hour in feeding, 12.89% in walking, 17.54% in foraging, 17.03% in digging, 9.76% in playing, 9.86% in sleeping, 15.62% in sitting and 16.44% in stereotypic nodding activity while an adult Himalayan bear in captivity spends 15% of 8 hr time in walking, 13.5% in foraging, 13% in digging, 3.5% in playing, 15.5% in sleeping, 16.5% in sitting, 10% in bathing, 12% in stereotypic nodding and 1% in feeding in a day. We observed that Himalayan bear and Sloth bear spend 1% of time in feeding because food is provided during

evening only. During exhibition of active behaviour the Himalayan bear spends 13.50% of time in foraging activity while black bear spend 17.54% over it. Garshelis and Pelton (1980) showed that black bear (*Ursus americanus*) can spend upto 75% of their time in foraging in natural habitat.

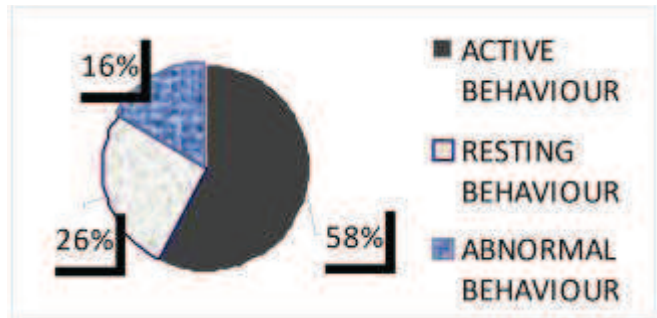


Figure 1. Percentage of three categories of behaviour performed by Sloth bear.

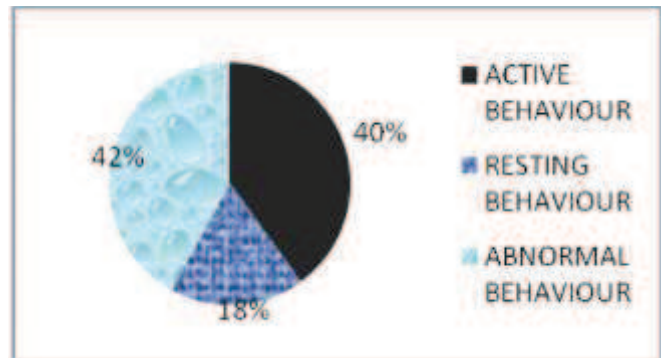


Figure 2. Percentage of three categories of behaviour performed by Himalayan bear.

Resting behaviour is higher in Himalayan bear (42%) than sloth bear (26%) because both of them are adapted to two different climatic conditions and as Himalayan bear lives at higher altitude so it is adapted to comparatively colder climatic condition and thus in order to resist high temperature it shows more resting in comparison to sloth bear. Abnormality was observed in both but the percentage was found higher in sloth bear (16%) than in Himalayan bear (12%) (Figure 1 and 2).

Table 5.

Day-1 BEHAVIOUR EXHIBITED BY THE SELECTED SPECIES AT DIFFERENT TIME INTERVAL.

Symbols meaning as W- Walking, D- Digging, F- Foraging, S- Sleeping, P- Playing Si-Sitting, S.N- Stereotypic nodding, B- Bathing, S.B- Self-biting, H.P- Hair-plucking, Ag- Agression, S.P- Stereotypic pacing.

Time interval	Behavior exhibited by four different animals			
	Sloth bear	Himalayan bear	Rhesus monkey	Lion-tailed monkey
7:15-8:30(morning)	W, D, F, SL, Si, S.N	W, D, F, SL, Si, B, S.N	Sc, Ag, W, Si, S.P, S.B, H.P	Fe, F, W, Sc, Si, S.P, H.P
8:30-10:30(late morning)	W, D, F, SL, Si, S.N	W, D, F, SL, Si, B, S.N	Sc, Ag, W, Si, S.P, S.B, H.P	Fe, F, W, Sc, Si, S.P, H.P
10:30-1:30(forenoon)	W, D, F, SL, Si, S.N	W, D, F, P, SL, Si, B, S.N	Sc, Ag, W, Si, S.P, S.B, H.P	Fe, F, W, Sc, Si, S.P, H.P
1:30-3:30 pm(afternoon)	W, D, F, P, SL, Si, S.N	W, D, F, P, SL, Si, B, S.N	Sc, Ag, W, Si, S.P, S.B, H.P	Fe, F, W, Sc, Si, S.P, H.P
3:30-5:15 pm(evening)	W, D, F, P, SL, Si, S.N	W, D, F, P, SL, Si, S.N	Sc, Ag, W, F, Si, S.P, S.B, H.P	Fe, F, W, Sc, Si, H.P

Table 6.

Day-2 BEHAVIOUR EXHIBITED BY THE SELECTED SPECIES AT DIFFERENT TIME INTERVAL.

Time interval	Behavior exhibited by four different animals			
	Sloth bear	Himalayan bear	Rhesus monkey	Lion-tailed monkey
7:15-8:30(morning)	W, D, F, SL	W, D, F, SL, Si, S.N	Sc, W, Si, S.P, S.B, H.P	Fe, F, W, Sc, D, Si, S.P
8:30-10:30 (late morning)	W, D, F, P, SL, Si, S.N	W, D, F, SL, Si, B, S.N	Sc, Ag, W, Si, S.P, S.B, H.P	Fe, F, W, Sc, D, Si, S.P, H.P
10:30-1:30(forenoon)	W, D, F, P, Si, S.N	W, D, F, SL, Si, B, S.N	Sc, Ag, W, Si, S.P, S.B, H.P	F, W, Sc, D, Si, S.P
1:30-3:30 pm(afternoon)	W, D, F, P, Si, S.N	W, D, F, P, SL, Si, B, S.N	Sc, Ag, W, Si, S.P, S.B, H.P	Fe, F, W, Sc, D, Si, H.P
3:30-5:15 pm(evening)	W, D, F, P, Si, S.N	W, D, F, P, SL, Si, B, S.N	Sc, Ag, W, Fe, Si, S.P, S.B, H.P	Fe, F, W, Sc, D, Si, S.P, H.P

Symbols are as in the table 5.

On an average captive Lion-tailed macaques perform 4.73% feeding, 19.67% foraging, 18.52% walking, 17.38%scratching, 8.98%drinking, 20.43% sitting, 6.06%stereotypic pacing and 4.17% hair plucking activity and Rhesus monkey exhibits 1.13% feeding, 9.96% aggression, 13.10%walking, 15.67% scratching, 18.2% sitting, 16.80% stereotypic pacing, 11.39% self- biting and 13.67% hair plucking activity in a day during 8 hours of observation (7:15 a.m.- 5:15 p.m.). We observed that Lion-tailed macaques spent 4.73% of their time in feeding and 19.67% on foraging in captive condition but Sushma (2004) found that they spend 44.25% on feeding and foraging in natural habitat.

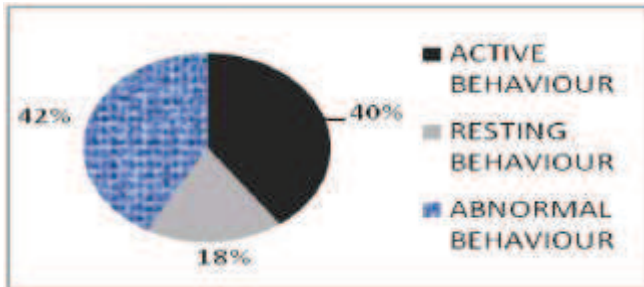


Figure 3. Percentage of three categories of behaviour performed by Lion-tailed monkey

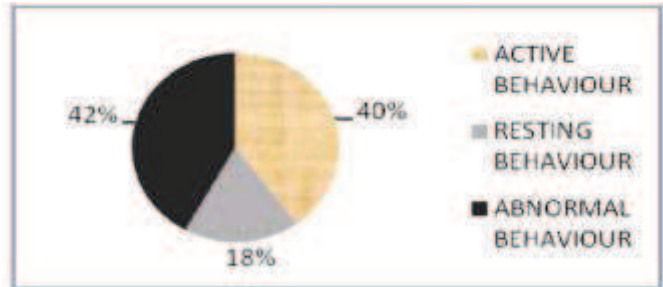


Figure 4. Percentage of three categories of behaviour performed by Rhesus monkey

The percentage of abnormal behaviour observed in Rhesus monkey was higher than Lion-tailed monkey. We found that Rhesus monkey housed in barren cages with hard substrate exhibited high level of abnormal behaviour (42%) and low level of active behaviour (40%) while Lion-tailed monkey housed in open moated enclosure possessing natural features (trees, shrubs, water bodies, soft soil) exhibit high level of active behaviour (69%) and low level of abnormal behaviour (10%). Mallapur and Choudhery (2005) also observed that individuals housed in barren cages with hard substrates exhibited higher levels of abnormal behaviour and lower levels of foraging and active behaviour compared to individuals housed in complex open- moated enclosure with soft substrate, however many animals in their natural habitats spend a large portion of their daily activity budget in the search for and consumption of food but in captive condition however food is generally provided. Non-human primates are also sensitive to enclosures in which they are housed that is an enclosure complexity, enclosure type, enclosure substrate (Table2) which influences their behaviour repertoire (Reinhardt 1997).

Conclusion :

We concluded that abnormality was observed in both Himalayan bear(12%) and sloth bear(16%) in the form of stereotypic nodding in captivity. Rhesus macaques in barren cages showed self-biting and aggression while Lion-tailed macaque in open-moated enclosure exhibited high percentage of activity and low abnormality.

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