

MOTHER - INFANT RELATIONSHIPS AND INFANT BEHAVIOUR OF RHESUS MACAQUE (*MACACA MULATTA*) IN SHINMA TAUNG AREA, YESAGYO TOWNSHIP, MAGWAY REGION

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Abstract

Mother - infant relationships and infant behaviour of rhesus macaque (*Macaca mulatta*) from Shinma Taung area, Yesagyo Township, Magway Region was investigated during June, 2013 to February, 2014. The maternal care showed various motherly activities such as suckling, grooming, ventral and dorsal carrying. The behavioral data included the time spent on various infant activities. The activities patterns were observed on the focal sampling using five minutes scan at ten minutes intervals from 08:30hr to 16:30hr. A total of 288 scan samples in 1440mins of scan time were used. Based on nine months data, rhesus infant spent 20.21% of total time on grooming, followed by 16.88% on suckling, 15.14% on feeding, 14.03% on playing , 10.56% on moving (off mother), 10% on resting, 6.74% carrying infant ventrally and 6.46% carrying infant dorsally. Rhesus infant spent more time on grooming compared to the other activities. The strongest social bonds were linked between mother and infant.

Keywords: *Macaca mulatta*, mother-infant relationships, infant behaviour, Shinma Taung

Introduction

A characteristic feature of primate's life history is the prolonged period of postnatal development in which newborns depend on adults especially their mothers, for nutrition, transport and protection. Many researchers have focused on the development of infant nonhuman primates, attempting to identify factors that influence the ontogeny of social behavior, with strong emphasis on the mother – infant relationship (Nicolson, 1987).

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Studies on infant development in Old World monkeys have concentrated on macaques, especially *Macaca mulatta* (Forster and Cords, 2002). Animals allocate resources, both time and energy, to offspring care at a cost to their own maintenance, survival or future reproduction (Altmann and Samuels, 1992).

Most studies on primate maternal styles have been conducted with Cercopithecine species in which variation in infant - directed behaviors usually fall along two dimensions: protection and rejection (Lathouwers and Elsacker, 2004).

Rhesus mother and infant relationship are the most intimate and long lasting of all the relationships (Rowell *et al.*, 1964). The infants of rhesus monkeys begin life completely development on their mother for survival, receiving all nourishment, physical warmth and other basic biological support. Rhesus mothers are usually very restrictive as they restrict the movements and social contacts of their infants from approaching or being approached by other monkeys (Sambyal *et al.*, 2009). The physical contact between mother and infant is influenced by the mother's feeding behavior (Jhnson, 1986).

Rhesus monkey, infants develop distinctive social relationships with their mothers and with same-age peers during their initial weeks and months of life respectively. However, these relationships differ substantially, from one another in several fundamental ways. An infant attachment relationship with its mother is firmly established long before it begins any interactions with peers. The resulting attachment is specific to its mother whereas the infant typically develops multiple relationships with several different peers. The infant's frequency and duration of interactions with its mother are highest during its first month of life and decline steadily thereafter, especially following the birth of younger siblings (Suomi, 2005).

Data on behavior of macaques from different places already existed Naw Phaw Phaw Say, 2005; Aye Mi San, 2007 and Nwe Nwe Win, 2013. Therefore there is sometime needed to carry out the same trend work in Shinma Taung area. The monkeys become so much accustomed to the human

presence, making it easier to conduct study. Thus Shinma Taung was chosen as the area of study.

The objectives of the present study are:

- to study the relationship between rhesus mother and different ages of infant
- to compare the activity patterns of infant in rhesus macaque.

Materials and Methods

Study area

The study site is Shinma Taung area located at Yesagyo Township, Magway Region. The location of the area is situated between North latitudes (21° 35' N and 21° 38' N) and East longitudes (95° 03' E and 95° 10' E). According to the data from Dry Zone Greening Department, Pakokku District, the highest peak of Shinma Taung is 525.52 meters (1723 ft) and total area is 687.17 hectares (18995 acre) wide. It is covered with deciduous forest (Fig 1, Plate 1).

Study period

The study was conducted from June, 2013 to February, 2014.

Study group

From the study site, nine pairs of mother with offspring were selected as focal sampling monkeys. All individuals were recognized by features of their faces, tails and others body parts.

Activity pattern

The field's trip was conducted once a month (one day) during the study period. Data was collected using five minutes scan sampling with ten minutes intervals from 08:30 hr to 16:30hr. A total of 288 scan samples in 1440 mins of scan time were used. Behavioral data included time spent on various infant activities and activity between mother-infant relations was observed according to Foster and Cords (2002).

Behavioral categories

Suckling behavior	- Infant sucks nipple in mouth (whether clinging or not)
Grooming behavior	- Infant groomed by mother
Resting behavior	- Sitting off mother, sleeping, not engaged in social interaction, nor feeding.
Ventral carrying	- carrying position ventrally by mother
Dorsal carrying	- carrying position dorsally by mother
Moving (off the mother)	- Infant locomoting off mother
Playing	- social play with peers
Feeding	- searching for, manipulating and swallowing food items

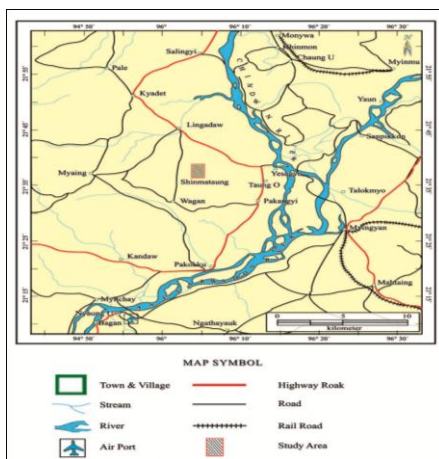


Plate 1. Study area of Shinma Taung

Figure 1. Map of Shinma Taung area (Source: Geology Department, Pakokku University)

Results

Mother-infant relationship and infant behaviour

The newborn offspring was usually taken care of by females. Newborn infant spent a great deal of time nursing or sleeping on chest of its mother (Plate 1, and 2). Mother may restrict and control the activities of its infant by physically restraining it and by making contact with it frequently.

Time on mother (ventrally)

While the infant was on the mother, it regularly changed positions. During one month old infant, the infant was almost always positioned ventrally to the carrying mother (Plate 3). But infant was not found ventrally to the carrying mother during the six months old (Table 1). The infant spent on the mother (ventrally) was 21.88% of time at the 1st month, 15.63% of time at the 2nd month, 13.75% of time at the 3rd month, 6.55% of time at the 4th month and 3.13% of time at the 5th month, respectively (Fig. 1, Table 2).

Time on mother (dorsally)

The infant began riding dorsally during the two months old infant (Plate 4). As the infant achieved locomotion independence, the percentage decreased to 9.38% during the 6th month and 6.25% by the 7th month. By the 8th month, the mother seldom carried the infant when traveling (3.13%) but never observed by the 9th month (Fig. 1 and Table 2).

Suckling

Mother helps with hands only pressing the infant to ventral side while carrying or suckling. Mother was generally very attentive to her infant but sometimes had difficult supporting infant in gaining nipple access, especially while moving or foraging. The infant spent on the nipple 39.38% of time at the 1st month, followed by the 2nd month with 37.50%, the 3rd month with 30%, the 4th month with 23.13%, the 5th month with 15% and the 6th month with 6.88% (Fig.2, Table 2). Although the mother rejected the infant for the

first time in the five months old, the infant was being nursed still at the six months old (Plate 5).

Grooming

Infant received a great deal of grooming from its mother beginning on its first day of life (Plate 6). The highest time spent on grooming of infant rhesus was found 28.13% of time by the 1st month, the 2nd month with 25%, the 3rd month with 23.13%, the 4th and 5th months with 18.75%, the 6th and 7th months with 17.50%, the 8th month with 16.88% and the 9th month with 16.25% (Fig. 2, Table 2).

Time off mother (moving)

The time of an infant spent off the mother increased with age (Plate 7). The infant spent moving (off the mother) 3.13% of time at the 3rd month, 9.38% of time at

the 4th month, 10.63% of time at the 5th month, 15.63% of time at 6th month, 17.50% of time at 8th and 20% of time at the 9th month. (Fig. 2, Table 2).

Resting

The infant spent time sitting off mother, sleeping, not engaged in social interaction and nor feeding. The infant spent resting 10.63% of time at the 1st month, 9.38% of time at the 2nd month, 8.13% of time at the 3rd month, 9.38% of time at the 4th month, 10% of time at the 5th month, 11.25% of time at the 6th month, 10.63% of time at the 7th month, 10% of time at the 8th month and 10.63% of time at the 9th month (Fig.2, Table 2).

Playing

First social play occurred during the two months old of an infant. Early social play occurred with infant peers or small juveniles (Plate 8). When no playmates were available, solitary object play was observed and usually consisted of manipulation twigs and small sticks with hands and mouth. The infant spent 3.13% of time at the 2nd month, followed by the 3rd month with 9.38%, the 4th month with 12.50%, the 5th month with 15.63%, the 6th and 7th

months with 20.63%, the 8th month with 21.88% and 9th month with 22.50% (Fig.2, Table 2).

Feeding

Infant began to consume solid foods during the two months old, while riding dorsally the mother or moving about independently (Plate 9). It consumed solid foods 3.13% of time during the 2nd and 3rd months, 10% of time during the 4th month, 13.75% of time during the 5th month, 18.75% of time during the 6th month, 27.50 of time during the 7th month, 29.38% time during the 8th month and 30.63% time during the 9th month (Fig.2, Table 2).

Based on the data for nine months, it was found that rhesus infants spent 20.21% (32.33 ± 13.29 min) of their total time on grooming, followed by 16.88% (27 ± 7.45 min) on suckling, 15.14% (24.22 ± 25.93 min) on feeding, 14.03% (22.44 ± 6.69 min) on playing, 10.56% (16.89 ± 12.77 min) on moving, 10% (16 ± 1.50 min) on resting, 6.74% (10.78 ± 13.42 min) carrying infant ventrally and 6.46% (10.33 ± 19.22 min) carrying infant dorsally (Fig. 3).

Table 1 Monthly duration on activity pattern of rhesus infant in Shirana Taung (observation time = 1440 mins).

Activity pattern	Time spent on activity pattern (mins)										
	June, 13 1 st	July, 13 2 nd	Aug, 13 3 rd	Sep, 13 4 th	Oct, 13 5 th	Nov, 13 6 th	Dec, 13 7 th	Jan, 14 8 th	Feb, 14 9 th	Total	Mean \pm SD
Ventral carrying	35	25	22	10	5	0	0	0	0	97	10.78 \pm 13.29
Dorsal carrying	0	10	15	17	21	15	10	5	0	93	10.33 \pm 7.45
Suckling	63	60	48	37	24	11	0	0	0	243	27 \pm 25.93
Grooming	45	40	37	30	30	28	28	27	26	291	32.33 \pm 6.69
Moving (off the mother)	0	0	5	15	17	25	28	30	32	152	16.89 \pm 12.77
Resting	17	15	13	15	16	18	17	16	17	144	16 \pm 1.50
Playing	0	5	15	20	25	33	33	35	36	202	22.44 \pm 13.42
Feeding	0	5	5	16	22	30	44	47	49	218	24.22 \pm 19.22

Table 2 Monthly activity pattern of infant spent (observation time = 1440 mins).

Month	Activity pattern of infant (%)									
	Ventral carrying	Dorsal carrying	Suckling	Grooming	Moving	Resting	Playing	Feeding		
June, 13 (1 st)	21.88	0	39.38	28.13	0	10.63	0	0		
July, 13 (2 nd)	15.63	6.25	37.50	25.00	0	9.38	3.13	3.13		
Aug, 13 (3 rd)	13.75	9.38	30.00	23.13	3.13	8.13	9.38	3.13		
Sep, 13 (4 th)	6.25	10.63	23.13	18.75	9.38	9.38	12.50	10.00		
Oct, 13 (5 th)	3.13	13.13	15.00	18.75	10.63	10.00	15.63	13.75		
Nov, 13 (6 th)	0	9.38	6.88	17.50	15.63	11.25	20.63	18.75		
Dec, 13 (7 th)	0	6.25	0	17.50	17.50	10.63	20.63	27.50		
Jan, 14 (8 th)	0	3.13	0	16.88	18.75	10.00	21.88	29.38		
Feb, 14 (9 th)	0	0	0	16.25	20.00	10.63	22.50	30.63		
Percentage	6.74	6.46	16.88	20.21	10.56	10.00	14.03	15.14		

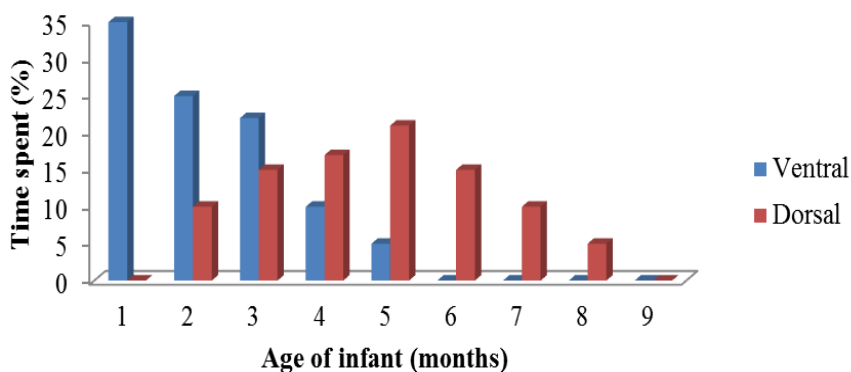


Figure1. Monthly time spent according to the position adopted by infant staying on the mother

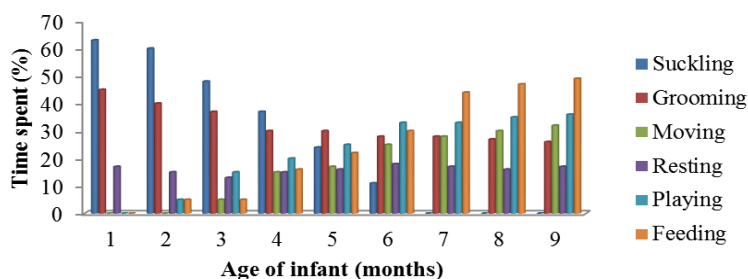


Figure2. Monthly time spent on infant according to mother-infant relationship

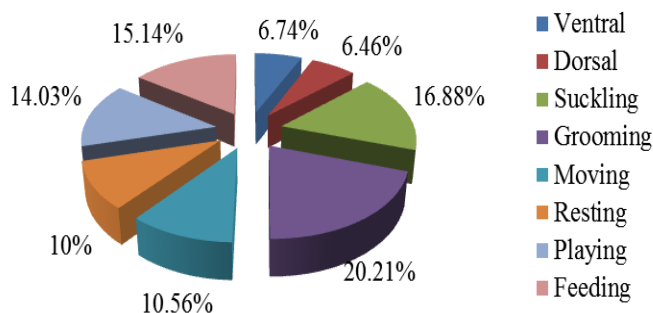


Figure3. Percentage of the activity patterns of infant *Macaca mulatta*



Plate1. Focal study groups of mother and infant



Plate 2. Embraced her infant with one arm



Plate3. Mother carrying her infant (Ventral side)



Plate 4. Mother carrying her infant (Dorsal side)



Plate 5. Suckling behaviour



Plate 6. Grooming behaviour



Plate7. Moving behaviour



Plate 8. Playing behaviour



Plate 9. Feeding behaviour

Discussion

Mother-infant relationship and infant behavior of rhesus macaque (*Macaca mulatta*) were conducted during the study period of June, 2013 to February 2014. In this study, transference of infants between their parents was rarely observed during the study months Dixon and Fleming (1981) reported that after the infant *Aotus lemurinus* had suckled, transfer from mother to father occurred. This is probably due to different habit of species.

In the present study, ventral carrying position occurred most frequently during the one month old infant rhesus but thereafter the infant was increasingly positioned on the dorsal surface of the mother. Moreover the

infants spent 6.74% of their total time on mother (ventrally) and 6.46% on mother (dorsally). This finding is in agreement with the statement of Dixson and Fleming (1981) that the mother carries the single offspring during the 1st week in *Aotus Lemurinus*. It may be assumed that this shows a strong and affectionate social bond between mother and her infant.

In this study the infants spent 16.88% of their total time on suckling. The infant did not remain on the nipple of the mother often at about 6 months old. This finding is in agreement with the statement of Fooden *et al.* (2000), who found that at about four or five months of age, mothers begin to resist the attempts of their offspring to suck or nurse.

Immature rhesus monkeys resemble many other primate species in enduring grooming relationship with their mothers. In this study during the one month old, rhesus infants spent the most time on grooming (20.21%) compared to other months. This is similar to a study of Aye Mi San (2007) that young infants were groomed more often by their mothers than older infants. It is assumed that the frequency of mother to infant grooming depends on the age of infant. Moreover most immaturity groomed with their mothers more than with any other partner. This is similar to a study of Nwe Nwe Win (2013) that mothers continue to groom their offsprings while they are moving out from the group. It is assumed that the social bonds are the strongest ones between mothers and infants.

During the three or four month old infant, they began gradually to break contact with their mothers. Moreover mothers also gradually rejected the attempt of their infants to make contact and gain access to nipple. The infants spent time of 10.56% moving (off the mother). This finding is supported by Hinde and Spencer-Booth (1967), who reported that during the first few weeks of infant life, mothers are almost entirely responsible for maintaining contact and proximity of their infants. During the two or three months old infant life, mothers frequently break contact with and walk away from their infants, while the infants follow their mothers and make contact

with them. It may be assumed that mothers encourage their infants staying independently.

In this study, during the two months old infants spent time playing with twigs and leaves. As infants became more independent, they spent increasing amount of time in rough and tumble play with their peers. The infants spent time of 14.03% on playing. This is similar to a study of Nwe Nwe Win (2013), who reported that the juveniles and infants spent more of playing behavior of than the adults. This finding is similar to the report of Rotundo, *et al.* (2005), who found that during the second month most play consisted of the infant moving and jumping around other members of the group on playing with twigs and leaves. When the infants were three months old, they started chasing juveniles in the group. When the infants were older, play chases continued. It is assumed that it is associated with their physical and behavioral development and socialization.

In this study infant began to consume solid food at the two months old and it was weaned by seventh month. The infant spent 15.14% of this total time on feeding. This finding is supported by Rotundo, *et al.* (2005), who reported that in Argentina, infants began to manipulate twigs and food items during the two months old and that by four months old they eat fruits. It is assumed that infants explore the environment and start foraging independently.

It was concluded that rhesus infants spent the most time on grooming compared to other activities. The grooming between mother and her younger infant was frequently observed especially in the birth season. So the strongest social bonds are linked between mother and infant. Thus it is important for the group living primates. The finding of the present study is contributing to future researchers who study with reproductive biology and animal behaviors of macaques in Myanmar.

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