

# Social Behavior of *Macaca Fascicularis* Raffles (1821) at Various Age Levels in the Banjarnegara Ex-Situ Conservation Area During Pandemic Times

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## ABSTRACT

*Macaca fascicularis* is one of the nonhuman primates that live in groups with many males and females (multi male multi female group) so that interactions between individuals often occur. Despite having a wide distribution, *M. fascicularis* continues to decline in population. One of the efforts to protect *M. fascicularis* from extinction is to provide an ex-situ conservation area. The purpose of this study was to analyze social behavior at various age levels of *M. fascicularis* in the Banjarnegara ex-situ conservation area. This research was conducted during the COVID-19 pandemic using the focal animal sampling method. The observation object in this research were puppies, juveniles, adult males and adult females. The results showed that the age level of puppies was dominated by affiliation behavior by 50%, The adolescent age level is dominated by grooming and playing behavior by 46.1%, while the adult age level is dominated by grooming behavior by 60.2%. The social behavior that most often appears is grooming with a frequency of 233.33 times at the adult age level and the behavior that rarely appears is agonistic behavior as much as 8.5 times at the adolescent age level. The longest duration of social behavior was found in adult grooming for 80.4 (seconds). The conclusion of this study is that the social behaviors observed during the pandemic include grooming, agonistic, sexual, affiliation and play. Most of the social behavior of *M. fascicularis* in ex-situ conservation areas experienced an increase in frequency compared to before the pandemic, except for agonistic behavior which decreased in frequency during the pandemic.

**Keywords:** age level, *Macaca fascicularis*, pandemic, social behavior.

## 1. INTRODUCTION

Indonesia is known as a biodiversity country, because it has abundant natural resources. One of these natural resources is primate fauna. The type of primate that has a high distribution and population in Indonesia is *M. fascicularis*. *M. fascicularis* began to experience a sharp population decline [1]. This population decline since *M. fascicularis* is often traded and illegally taken directly from the wild. IUCN 2020 states that *M. fascicularis* is included in VU (Vulnerable) animals or species with a vulnerable risk of extinction. Based on the conservation status, it is necessary to conserve *M. fascicularis* both ex-situ and in-situ.

*M. fascicularis* has a role in forest regeneration assisting the dispersal of seeds through the fruits eaten, in addition *M. fascicularis* also acts as a controller of insect populations in nature [2]. The characteristic feature of *M. fascicularis* is that it lives in groups led by alpha individuals. This tendency to live in groups causes *M.*

*fascicularis* to be inseparable from social interactions between individuals. This social interaction causes the emergence of different activities between individuals of *M. fascicularis* both by sex and age [3]. Social behavior in primates shows the pattern of how the primate individual acts. Social behaviors that occur in primates include grooming, sexual, agonistic, affiliation and play. The behavior of *M. fascicularis* in ex-situ conservation areas such as zoos is strongly influenced by the presence of visitors, environmental conditions and the cage system.

One of the ex-situ conservation efforts is the establishment of a zoo. This zoo acts as a conservation institution, educational facility, as well as a source of broodstock and genetic reserves that support in-situ conservation [4]. During the COVID-19 pandemic, the ex-situ conservation area in Banjarnegara issued a new policy regarding limiting working hours and closing the area. Observation of social behavior of *M. fascicularis*

during this pandemic aims to analyze how social behavior occurs and to analyze the value of the frequency, relative frequency and duration of social behavior that occurs.

## 2. METHOD

This research was conducted in Banjarnegara, Central Java in June-July 2020. The objects observed were male and female *M. fascicularis* at various ages (adult males, adult females, juveniles and infant).

Direct observation was conducted to collect the characteristics of each individual of *M. Fascicularis* and its adaption using purposive sampling method. Data collection on social behavior of *M. fascicularis* was carried out using the focal animal sampling. Observations were made from 8 am to 3 pm. Data recording was done by continuous sampling method with 50 minutes intervals of observation and 10 minutes of rest. The social behavior observed was grooming (investigating), sexual, affiliative, agonistic and play behavior. The environmental parameters recorded were temperature and humidity. The secondary data in this study were the individual history of the object and the condition of the cage.

Calculation of relative frequency is calculated using the Martin and Bateson (1988) formula:

$$\text{Relative frequency} = \frac{\text{total of certain social behavior activities}}{\text{total of social behavior activities}} \times 100\%$$

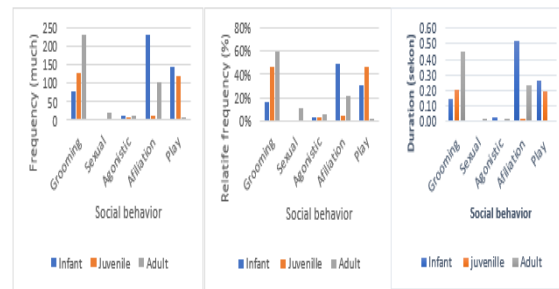
The duration value is obtained from the calculation using the formula using the formula:

$$\text{Duration} = \frac{\text{total time of certain social behavior (seconds)}}{\text{total time of observation (seconds)}}$$

This data was analyzed descriptively comparatively at various age levels of *M. Fascicularis*.

## 3. RESULTS

*M. fascicularis* in ex situ conservation Banjarnegara are 7 individuals (3 adults, 2 juveniles and 2 infant). During observation of *M. fascicularis* was not only interaction among individuals of the same age level, but also in pairs with individuals from other groups except for sexual behavior that is carried out only with adult group individuals. Social behavior takes place in all parts of the d cage, on the floor, enrichmet trees, fences and roofs.



**Figure 1** Graph of observed social behavior. A. Graph of the frequency of social behavior., B. Graph of the relative frequency of social behavior., C. Graph of the duration of social behavior of *M. fascicularis*.

Allogrooming was carried out by *M. fascicularis* in the conservation area usually starts at the ends of the body and spreads to the armpits or groin of the allogrooming partner, sometimes starting from the back. While *autogrooming* is usually done using one hand or foot and some have been observed shaking their bodies to clean themselves. When doing allogrooming, there are individuals who provide grooming and individuals who receive grooming. Adult individuals and adolescents during allogrooming can act as both givers and recipients of grooming, while in puppies only act as recipients of grooming. Grooming frequency of *M. fascicularis* in TWA Grojogan Sewu recorded 145 times [3]. The total frequency of grooming *M. fascicularis* in the Banjarnegara ex-situ conservation area during the pandemic at all age levels was higher than other place, which was 436.8 times (Figure 1).

Sexual behavior of *M. fascicularis* in the ex-situ conservation Banjarnegara was only found at the adult age level as much as 21.67 times with a duration of 3.6 seconds (Figure 1). The observed sexual behavior of *M. fascicularis* did not always reach the ejaculation stage and not all sequences were carried out. Stages of adult age are only observed showing genital (hindquarter present) and genital examination (inspection) by adult males. Sometimes sexual behavior is carried out directly at the mounting stage or when the male climbs the female without showing genitals (hindquarters permission) and genital inspection (inspection). Before engaging in sexual behavior, adult males usually approach adult females to provide a stimulus in the form of grooming or agonistic behavior. if the female individual is in estrus, sexual behavior occurs and sexual behavior does not occur if the adult female is not in estrus. The frequency of sexual behavior of *M. fascicularis* in TWA Grojogan according is 5 times, this is the same as the value of the frequency of sexual behavior of *M. maura* in Lejja nature tourism, Sopeng as much as 5 times [5]. The sexual frequency value of *M. fascicularis* in the Banjarnegara ex-situ conservation area during the pandemic was much higher than in TWA Grojogan Sewu and in Lejja Sopeng nature tourism, which was 21.67 times.

The emergence of agonistic behavior in the Banjarnegara ex-situ conservation area is influenced by 2 factors, namely factors from outside the cage and factors from inside the cage. If conditions outside the cage or inside are not conducive, this can provide a stimulus to *M. fascicularis* which produces an agonistic behavioral response. This unfavorable condition can be in the form of sounds from other animals, cats or officers passing through the cage or from noise in the cage. The agonistic frequency of *M. fascicularis* in Nature Park Selangor was recorded 628 times [6]. The frequency of *M. fascicularis* agonistic behavior in TWA Suranadi Lombok is 126 times [7]. Compared to the frequency of agonistic behavior in TWA Suranadi Lombok, it can be concluded that the frequency of agonistic behavior in ex-situ conservation areas decreased during the pandemic with a frequency range of 8.5-13 times a day at all age levels (Figure 1). This is because during the pandemic the Banjarnegara ex-situ conservation area was closed for tourist visits, so there was no stimulus from visitors that affected the agonistic response of *M. fascicularis*.

Affiliation behavior during observation of *M. fascicularis* in the Banjarnegara ex-situ conservation area was divided into 2 sub-activities, namely contact and breastfeeding. Hugs and cuddles are included in the contact subactivity. The age level of tillers has the highest frequency of affiliation compared to other age levels as much as 230.5 times (Figure 1), because one of the characteristics of the infant is that it is always in its mother's arms and also still suckling its mother. Affiliation behavior usually arises because two individuals approach each other and then they give a hug response because one individual feels threatened, for example, infant who feel threatened because of the tense cage conditions approach an older individual for protection. This behavior is also one of the instincts of the mother to always take care of her infant.

Play behavior in the Banjarnegara ex-situ conservation area include fighting, biting each other, chasing each other, hanging from trees or roofs, playing with water and pulling tails. Adult individuals are observed to perform play behavior even though the frequency and duration is very low, this behavior is beneficial for adult individuals to reduce stress and as a form of affection [8]. Interaction in *M. fascicularis* known as rough and tumble or a way of playing that tends to be rough but does not show any indication of agonistic behavior. Play behavior usually begins when one individual attracts the attention of his partner's individual by pulling the tail. Then the individual pairs will respond in the form of encouragement, then the two individuals interact with each other, tugging or biting each other. Frequency of play *M. fascicularis* in TWA Grojogan Sewu was 77 times [3]. Frequency of play behavior of *M. fascicularis* in Padang Teratak Wildlife Sanctuary was 52 times [9]. The frequency of playing *M. fascicularis* in the Banjarnegara ex-situ conservation area during the

pandemic was higher than in other places, the frequency was 263 times (Figure 1).

#### 4. CONCLUSION

The social behaviors of *M. fascicularis* in Banjarnegara ex-situ conservation area grooming, agonistic, affiliation and playing behavior. Sexual behavior is only observed at the adult age level. The frequency of social behavior of *M. fascicularis* in the ex-situ conservation area of Banjarnegara ranged from 8.5 to 233.33 times during the study with the highest frequency of behavior with the highest frequency of grooming behavior at all age levels. The relative frequency of the highest social behavior of *M. fascicularis* was 60.2% for grooming behavior at the adult age level and the lowest percentage was 2.2% at the adult age level playing behavior. The longest duration of social behavior is 80.4 (seconds) in adult grooming behavior and the shortest duration is 1, 2 (seconds) on agonistic behavior at the adolescent age level. The frequency of grooming, sexual, affiliation and playing behavior of *M. fascicularis* in the Banjarnegara ex-situ conservation area has increased than other research

during the pandemic, while the agonistic behavior of *M. fascicularis* in the Banjarnegara ex-situ conservation area has decreased in frequency during the pandemic.

#### ACKNOWLEDGMENTS

The researcher would like to thank to Banjarnegara ex situ conservation who support and also help during research.

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