LEPROSY IN SUB-HUMAN PRIMATES: POTENTIAL RISK FOR TRANSFER OF *MYCOBACTERIUM LEPRAE* TO HUMANS

Sir,

In recent years there have been a number of publications[1–7] dealing with the possibility of leprosy, or a leprosy-like disease, in sub-human primates. The risk of transmission of *Mycobacterium leprae* from any source is a function of exposure, and whether this is accomplished by aerosols, direct physical contact, vectors, or fomites the likelihood is that such transmission is dependent upon the duration of exposure. In order to investigate the possible role of sub-human primates in the transmission of leprosy to human beings, we undertook a study in order to (1) compare the prevalence of leprosy in the general population of an endemic area with the prevalence of leprosy in individuals having daily contact with sub-human primates, and (2) investigate the possibility that these sub-human primates may constitute a potential risk for transmission of *M. leprae* to susceptible humans.

Two states in India, Andhra Pradesh and Tamilnadu, contain 15% of India's total population

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but approximately 50% of the nation's known cases of leprosy. The prevalence rate in Andhra Pradesh, in 1981, was 14·5/1000 and in Tamilnadu 19/1000.[8] Both states also have a large population of monkeys. The leprosy control programme based in Salur, Vizianagaram District, Andhra Pradesh was selected as the base of operations. Para-medical workers and other staff members were utilized to discover the existence and location of owned monkeys. For the purpose of this study it was decided to use only owned monkeys since feral monkeys have no daily physical contact with humans and have little opportunity for transmission of the agent. India does not permit the capture and export of monkeys for laboratory use, therefore the potential for transmission to humans as a result of this activity is nil. When a monkey was located it was examined and an interview was conducted with the owner, photographic documentation obtained and, if the owner or any other close contacts of the monkey were known patients, or showed evidence of leprosy, a smear was made from the ear lobe of the monkey. (Facilities for performing immunological studies for antibodies against *M. leprae* antigens 5 and 7 were not available.) Information requested during the interview included occupation, residence, description of all individuals having close contact with the monkey, and descriptive information about the monkey (age, sex, species, time of ownership and use).

Twenty-six owned monkeys were found. Ages ranged from 1 week to 12 years. There were 15 males and 11 females. The most common species was *Macaca radiata* ('Bonnet monkey'). Only 3 monkeys were used as pets; the balance were 'working' monkeys that were used by beggars to perform simple tricks to acquire money (Table 1).

The 26 monkeys were in continual daily contact with 71 humans (family members and dependents of owners). Among these, 64 had no visible signs or history of leprosy, 4 had tuberculoid leprosy, 1 had indeterminate leprosy and 2 had lepromatous leprosy; a prevalence rate of 98·6/1000. The 6 monkeys in contact with these leprosy patients had negative ear lobe smears. Twenty-four monkeys were free of any visible signs of disease. One monkey (a pet) had bilateral axillary lymphadenitis due to an unidentified Gram positive, non-acid fast organism and one monkey had a clawed left hand. This monkey belonged to a patient with tuberculoid leprosy. An ulnar nerve biopsy performed on this monkey showed no significant lesions.

On the basis of this limited study it is impossible to establish any cause and effect relationship between daily contact with monkeys and increased incidence of leprosy in humans. In all instances the individuals with leprosy had been diagnosed as such *before* they acquired the monkey examined in this survey.

Two questions remain unanswered, however: (1) the possibility of transmission to these individuals by previously owned monkeys, and (2) the possibility of transmission of *M. leprae* from shedding owners to other humans via these monkeys.

As leprosy control programmes become effective in reducing the prevalence and incidence of leprosy it becomes important to consider non-traditional concepts of the method of transmission of the infectious agent. As anyone who has worked with leprosy patients knows, a large percentage have no idea of their source of infection. This may be explained, in part, by the long incubation period which makes accurate histories extremely difficult to obtain, but may also be explained by the fact that there might never have been a period of 'prolonged and intimate contact' with a person known to be infected. Airborne transmission probably accounts for a number of these cases.[9] The fact that spontaneously occurring leprosy has been identified in sub-human primates adds another possible method of transmission. The degree of risk from infected monkeys depends on the amount of contact between these animals and susceptible humans.

Contrary to what one might assume the monkeys that were kept as pets were not handled by many people. Two of the pet monkeys observed in this study were handled by only one person and the third by only 2 persons. The other members of the family either ignored the monkey or were afraid of it.

Monkeys used for begging, on the other hand, physically contact many people. They are taught

Table 1. Description of owned monkeys examined in Andhra Pradesh, South India during May–July 1982

Species	Age	Sex	Use	Daily human contacts with leprosy*	Daily human contacts without leprosy
Macaca mulatta	4 yr	M	Pet	0	4
M. radiata	3 yr	M	Work	1 (T)	1
M. radiata	1 yr	M	Pet	0	3
M. radiata	12 yr	F	Work	4 (1T, 1I, 2L)	2
M. radiata	3 yr	M	Work		
M. radiata	6 mon.	F	Work	0	4
M. radiata	1 yr	F	Work		
M. radiata	1 week	M	Work	0	12
M. radiata	2 yr	M	Work		
M. radiata	2 yr	F	Work		
M. radiata	4 yr	F	Work		
M. radiata	6 yr	M	Work		
M. radiata	7 yr	F	Work		
M. radiata	4 yr	M	Pet	0	7
M. radiata	6 mon.	M	Work	0	1
M. radiata	3 yr	F	Work		
M. mulatta	2 yr	M	Work	1 (T)	6
M. radiata	5 yr	F	Work	1 (T)	5
M. mulatta	1 yr	F	Work		
M. mulatta	1 yr	F	Work	0	8
M. mulatta	10 yr	M	Work		
M. radiata	6 yr	F	Work	0	1
M. radiata	1 yr	M	Work	0	7
M. radiata	2 yr	M	Work	0	1
M. radiata	2 yr	M	Work	0	1
M. radiata	2 yr	M	Work	0	1

* T, tuberculoid; I, indeterminate; L, lepromatous.

to do simple tricks which usually involve no contact with spectators, but several of the monkeys were observed to go around and kiss as many of the children as possible and all of them were taught to manually accept the coins offered to the beggar.

The *modus operandi* of the beggars adds a bit more to the potential risk. Some beggars remain in one village on a semi-permanent basis but the majority of those that used monkeys travelled from village to village, often over considerable distances, to take advantage of the crowds associated with festivals and pilgrimages.

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