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PREVALENCE OF EYE DEFECTS IN DOMESTICATED SRI LANKAN ELEPHANTS (*ELEPHAS MAXIMUS MAXIMUS*)

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ABSTRACT

The aim of this study was to investigate and scientifically document the prevalence and types of main eye defects seen in domesticated elephants of Sri Lanka. The study was conducted between April 1993 and April 1994 in 13 of the 24 administrative districts of the country using 140 domesticated elephants. Both eyes were examined for the presence of corneal opacities (in the form of non transparent cloudiness, scars or keratitis) and cataract of the lens. The results show that 27% (38 out or 140) had eye defects, an overall prevalence rate of 271:31 with corneal opacity (19 males and 12 females) a prevalence rate 221:5 with cataract (3 males and 2 females) a prevalence rate 0f 36: and 2 with total blindness (1 male and 1 female) a prevalence rate of 14. Further, the occurrence of eye defects was not gender dependent but was significantly (chi-square test: p=0.03, F=4.74,d.f.=1) higher in the older age group (41-75 years) compared to lower age group (3-40 years). It is concluded that the prevalence of eye defects amongst domesticated elephants in Sri Lanka is fairly high and therefore proper medical treatment should be given to prevent further impairment of vision in the affected animals.

Key words: *Elephas maximus maximus*, eye defects , Sri Lankan elephants, Asian elephant, Sri Lanka

INTRODUCTION

Eye defects of domesticated Asian elephants (*Elephas maximus*) are poorly documented (Evans, 1910; Ferrier, 1947; Krishnamurthy and Wemmer, 1996). In Sri Lanka too, although eye defects in captive elephants (*Elephas maximus maximus*) are frequently noticed it is not scientifically documented except for one preliminary study (Kodikara *et al.*, 1996). This study ,was therefore, undertaken to investigate and scientifically document the prevalence and types of main eye defects encountered in domestic elephants of Sri Lanka.

MATERIALS AND METHODS

This study was carried out during the period of April 1993 and April 1994. The sample consisted of 140 domesticated elephants (72 males and 68 females). These elephants were from 13 of the 24 administrative districts of the country, nine in the wet zone (Galle,Matara, Colombo, Gampaha, Kalutara, Ratnapura, Kegalle, Nuwara-Eliya and Kandy), three in the intermediate zone (Kurunegala, Matale and Moneragala) and one in the dry zone (Anuradhapura).

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Information regarding the address of owners and mahouts was initially obtained from Ven.Galaboda Gnanissara Thero, the chief incumbent of the Gangaramaya Temple, Hunupitiya, Colombo 02, who has organized the Nawam Perahera, a cultural pageant in Colombo, since 1979. Later, some information was also received from some elephant owners and mahouts during the course of data collection. The selection of the population was on an opportunistic basis rather than on random basis as there were no registers of domesticated elephants to choose from. Another reason was that in some areas domesticated elephants were sparsely distributed and whenever one was located, it was subjected to examination.

The observations were made at the elephants' working site, at owner's residence, mahout's residence, temples, dewales and when they were brought to participate in peraharas (the Colombo Nawam Perahera, the Kelaniya Duruthu Perahera, the Bellanwlia Esala Perahera, the Kandy Esala Perahera and the Esala Perahera of Aluthnuwara Dewale). The elephants were made to stand where maximum possible overhead sunlight reached the head region of the animals. Both eyes were then examined for the presence of cataract (white opaque lens of the eye) and corneal opacity (non-transparent cloudiness in cornea, scars in the cornea of keratitis). In addition, each respective mahout was asked whether in his opinion the elephant is completely blind or not. The sex of the animal was also noted.

The ages of the elephants were obtained from their respective mahouts or owners. The elephants were then categorized into two groups, 3-40 years and 41-75 years assuming the maximum life span is 75-80 years under captive conditions.

The prevalence rate was calculated using the formula, Prevalence rate = [Number of existing animals with eye defects / total population surveyed] x 1000

Data were statistically analyzed using chi-square test. Differences were considered to be significant if $p < 0.05$.

RESULTS

Out of the 140 elephants examined 38 (27%) had eye defects. Of these, 23 were males and 15 were females. The prevalence rate is 271. This gender difference in the occurrence of eye defects was not statistically significant ($p=0.26$, $F=1.2$, d.f. = 01). Of the 38 who had eye defects, 25 belonged to the higher age category (41 – 75 years) and 13 to the lower age category (3-40 years). The difference was statistically significant ($p=0.03$, $F= 4.74$, d.f. = 01).

As depicted in Table 1, out of the 38 elephants, which had eye defects, 31 (82%) elephants (19 males and 12 females) had corneal opacity of the eye, prevalence rate being 221. However, 8 elephants had corneal opacity in their right eye and 6 had opacity in their left eye, and 17 elephants had it in both the eyes. Two had cataract in their right eye, two had it in their left eye and the other one had it in both eyes. Of these 5 elephants with cataract, 3 were males and 2 were females. The prevalence rate for cataract was 36. Two elephants (5%) were blind. One female was blind in its left eye and one male elephant was blind in both eyes. The prevalence rate for blindness was 14.

Table 1
Number of elephants with different eye defects among 140 Sri Lankan domesticated elephants

	Number of elephants with corneal opacities	Number of elephants with cataracts	Number of elephants with blindness
Left eye	8	1	1
Right eye	6	2	-
Both eyes	17	2	1

DISCUSSION

This is the first study to document the prevalence and main types of eye defects encountered in domesticated elephants of Sri Lanka. In this study, 140 elephants from 13 (9 in the wet zone, 3 in the intermediate Zone and 1 in the dry Zone) of the 24 administrative districts representing 6 provinces of the country were examined. Further, due to inaccessibility, data was not collected in the Northern, North Central and the Eastern provinces, and the Puttalam district of the North Western Province. However, we have examined about 40% of the total domesticated elephant population in the island (Jayawardena, 1994). Therefore, we believe that the data obtained are representative for the entire domesticated elephants of Sri Lanka and that they are also meaningful in view of the large sample size.

The results show that 27% (38 out of 140) of elephants examined had either bilateral or unilateral eye defects in the form of corneal opacities (31 out of 38), cataract (5 out of 38) or total blindness (2 out of 39). This is a fairly high prevalence rate of eye defects. Further,as expected, there was no gender difference in the occurrence of eye defects and the prevalence of eye defects was significantly higher in the older age group (Carola *et al.*, 1990).

Corneal opacities impairs vision (Carola *et al.*, 1990) and in elephants sight is one of the dominant senses. In elephants, corneal opacities usually result from general ill health, debility, old age, wounds, ulcers and abscesses due to entry of foreign bodies or due to abrasions caused when moving through the jungles (Evans, 1910; Ferrier, 1974). In addition, in India, it is cited that, the eye problems of working elephants also result from the misuse of the long whipping stick carried by mahouts (Krishnamurthi and Wemmer, 1995). Exposure to direct sunlight may also cause corneal opacity (Krishnamurthi and Wemmer, 1995). The precise reason for high prevalence of corneal opacity in this group of elephants is unknown but is unlikely to be due to poor health or old age because the overall body condition index (which is a measure of health status) of these elephants has been reported to be 6.95 (Godagama *el al.*, 1998) and the mean age to be 37.4 years (Godagama *et al.*, 1998). Since some of the domesticated elephants in Sri Lanka work in direct sunlight, its effect on development of corneal opacity cannot be totally disregarded. In this aspect, it is note worthy to record that, in Tamilnadu, India, the Chief Conservator of Forests has recommended the use of thick leather sun shades or visors on elephants required to work in direct sunlight (Krishnamurthi and Wemmer, 1995). Several eye problems including corneal opacities had been described and to misuse of the long whipping stick carried by the mahouts (Krishnamurthi and Wemmer, 1995) . As in India, the misuse of ankus by local mahouts may, at least partly, contribute for the corneal opacity seen in this study. Improper or no eye treatment following foreign body entry,

injury at work and infective eye condition may also contribute substantially for corneal opacities observed in this study. In fact, several bacterial (*Staphylococcus aureas*, Beta haemdytic streptococci and Coliforms) and fungal (*Fusarium, Cladosporium, Curvularia or Aspergillus spp.)* pathogens are reported is swabs collected from infective eyes of Sri Lankan captive elephants (Kodikara *et al.*, 1996). Such a condition would cause serious problems both to the owner and to the elephant it self.

Cataract is the condition when the lens of the eye loses transparency and becomes cloudy so that light cannot get through in a normal way (Carola *et al.*, 1990). In this study, 3.5% of the captive elephants examined had cataract, which is more than the double the amount reported for humans in Sri Lanka (Bulathsinghala, 1998). There are various types of cataracts including congenital, senile, hyperglyceamic, traumatic and toxic (Carola *et al.*, 1990). According to the current owners and mahouts the cataract of their elephants was not present at birth. Senility is also unlikely to be a causative factor: elephants (Ratnasooriya, 1990) and humans (Carola *el al.*, 1990) have a more or less similar life expectancy and in humans, cataracts are generally associated with people over 70 years (Carola *et al.*, 1990). Random serum glucose levels of some of these elephants with cataracts were determined during the Navam perahera of 1998. Their serum glucose was within the normal range (Ratnasooriya *et al.*, 1999). Thus, the formation of the cataract cannot be ascribed hyperglycaemia. Therefore, the cataracts observed in this study are more likely to be traumatic in origin: in elephants cataracts result from blow to the eyes (Evans, 1910) and cataracts are rarely encountered in wild Asian elephants (Evans, 1910). We, however, have no evidence in favour or against for a toxic origin.

In the present study, 2 blinded elephant (1 blinded unilaterally and the other bilaterally) were encountered. According to the mahouts and their present owners, this is a congenital defect but seems unlikely. This may have been due to an injury that occurred during capture or at work. During the Nawam Perahera in 1998, we had the opportunity of examining the elephant which was blinded bilaterally. Both eyes exhibited pupil reflex to torch light indicating that the retina and the optic nerves were intact. However, blindness due to a cortical defects cannot be completely ruled out.

In conclusion, this study shows that 27% of domesticated elephants in Sri Lanka have eye defects. This is a matter for concern as most of these defects were encountered in relatively younger animals and both corneal opacities and cataracts would eventually lead to total blindness unless proper treatment is initiated, at least, now. Thus, it may be desirable to clean the eyes of the captive elephants very gently at the bathing time and to subject them to ophthalmoscopic examination at least once in two years. This can be done easily at annual Peraheras where majority of elephants participate.

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