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SPINAL CONFORMATIN OF DOMESTICATED SRI LANKAN ELEPHANTS (*ELEPHAS MAXIMUS MAXIMUS*)

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SUMMARY

The aim of this study was to investigate scientifically whether the five spinal conformations (Types 1 to 5) described for the Burmese elephant *(Elephas maximus birmanicus)* are also present in the Sri Lankan elephant (*Elephas maximus maximus*). This was done using 140 domesticated elephants and the Gale's five-description system. The results showed that the five spinal conformation types described for Burmese elephant are also present in the Sri Lankan elephant. Out of the 140 elephants, 23 (16%) had Type 1, 48 (34%) had Type 2, 5 (4%) had Type 3, 50 (36%) had Type 4 and 14 (10%) had Type 5 spinal conformation. The five types of spinal conformations were not equally distributed in the population (Chi Square test p =0.001, d.f.=4). Further there was a significant difference (Fisher's Exact test; p=0.001, d.f.=4) between the number of male elephants and female elephants falling into the five different types of spinal conformation.

Key words: Sri Lankan elephant, *Elephas maximus maximus*, spinal conformation

INTRODUCTION

Variations in the spinal conformation have been reported in the Asian elephant. (Ferrier, 1947; Deraniyagala, 1955; Gale, 1974). According to Deraniyagala (1955) in Sri Lankan elephant, *Elephas maximus maximus*, there are three different types of spinal confirgurations: a feebly arched spine descending from withers to the hips, a depressed or roached spine and one with a step like notch in the middle of the curve. According to him the first type is the most valuable, the second one is inferior and the third one is considered as the most common. According to Ferrier (1947) in Burmese elephants *Elephas maximus birmanicus* there are four types of spinal conformations: *Hnget-pyaw-gaing*, with a broad and unprominant spinal ridge and asymmetrical type of back; *Kha-dan* or prominant spinal ridge compared with the other forms; *Nga-pen-gon*, narrow and prominent spinal ridge; *Kone-pyat-that*, narrow and more prominent. Later, Gale (1974), described five distinct types of spinal conformations: *Hnyet-pyaw-gaing*, the back which hangs down like the bough of a banana tree; *Wet-kone*, the back shaped like the back of a pig; *Nga-hpe-gone*, the back which resembled that of a fresh water herring, which curves slightly downward and backwards; *Kone-pyat-that*, one which appears broken and at the same time curving sharply backward and *Kyaw-dan*, the straight flat back (Figure 1). In Burma too, the value of the animal and the quality class of the timber elephants are determined to a large extent by the spinal ridge (Gale, 1974). However, all these studies are based on anecdotal information and did not indicate the frequency of their distribution in the different types of the spinal configuration described (Ferrier, 1947; Gale, 1974). The purpose of this study was to investigate whether the five spinal conformations described by Gale (1974) are also present among the Sri Lankan elephants and, if present, to obtain an idea of their frequency among the Sri Lankan elephants and, if present, to obtain an idea of their frequency of distribution. This was done using domesticated Sri lankan elephants. We used the five classification system described for

Burmese timber elephants (Gale, 1974) since it includes three conformations previously described by Deraniyagala (1955) for Sri Lankan elephants.

MATERIALS AND METHODS

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

In this study, the five types of spinal conformations described by Gale (1974) were used as a guide line and sketches of these ware made (Figure 1). By looking at these sketches and a given elephant, each elephant was assigned to the most closely resembling type of the spinal cnformation. This was done while elephants were in standing position. The sex of the animals was also noted.

The morphological type of each elephant was recorded based on the description by Deraniyagala (1955): male elephant as 'Atha' (with tusks), 'Aliya' (with tushes) or 'pussa' (without tusks or tushes), and female elephant as 'Athinna' (with tushes) and 'Alidena' (without tushes).

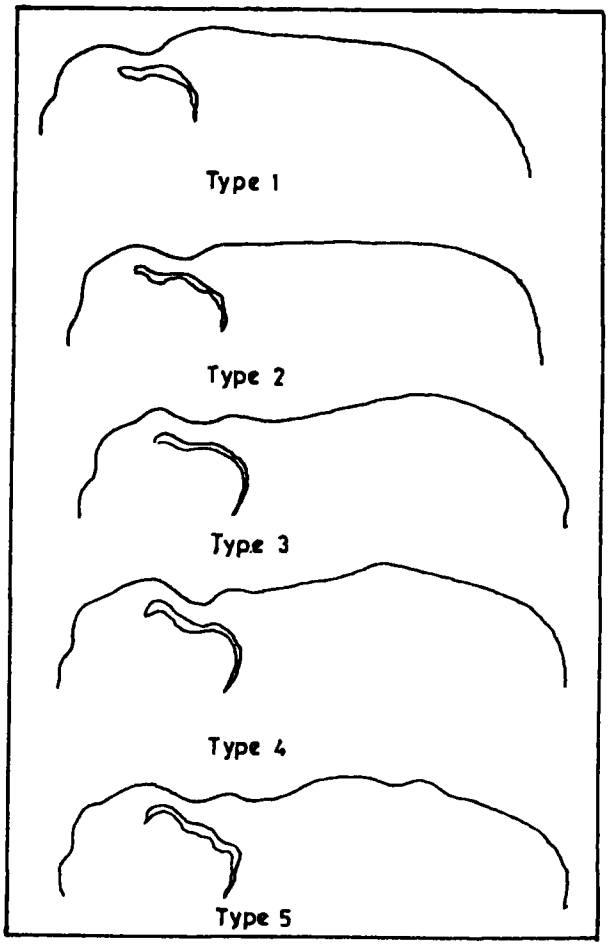

Figure 1. Spinal conformation sketched according to Gale's description

Statistical comparisons were made using SAS Ver. 6.0 (SAS Institute Inc., Cary, N.C., USA). Chi-Square test and Fisher' Exact test were used where appropriate. Probabilities with $P<0.05$ were considered as significant.

RESULTS

Of the 140 elephants 72 were males and 68 were females. Among the males 11 were 'Athas', 54 were 'Aliyas' and 7 were 'Pussas'. On the other hand, of the females 32 were 'Athinnas' and 36 were 'Alidenas'.

The distribution of the five types of spinal conformation in this sample is given in Table 1. The five types of spinal conformations were not equally distributed in the population (Chi-Square test, p=0.001, d.f=4).

Table 1
Distribution pattern of spinal conformation in domesticated elephants

Number of elephants	Percentage of elephants
23	16
48	34
5	4
50	36
14	10

The distribution of male and female elephants in relation to the types of spinal conformation are shown in Table 2 and Table 3 respectively. Thirty two (44%) males had Type 4 spinal conformation which includes three (4%) "Athas" and 29 (40%) "aliyas". However, 34 (50%) females had Type 2 spinal conformation and this includes 15 (22%) "Athinnas" and 19 (28%) "Alidenas".

Table 2
Distribution pattern of spinal conformation in domesticated male elephants

Types of spinal conformation	Total number of elephants	Number of "Athas"	Number of "Aliyas"	Number of "Pussas"
Type 1	14 (20)	5 (7)	7 (10)	2 (2)
Type 2	14 (20)	2 (2)	10 (14)	2 (2)
Type 3	2 (2)	0 (0)	2 (2)	0 (0)
Type 4	32 (44)	3 (4)	29 (40)	0 (0)
Type 5	10 (14)	1 (1)	6 (8)	3 (4)

Percentage in parentheses

Table 3
Distribution pattern of spinal conformation in domesticated female elephants

Types of spinal conformation	Total	"Athinna"	"Alidena"
Type 1	9 (13)	4 (6)	5 (7)
Type 2	34 (50)	16 (24)	18 (26)
Type 3	3 (4)	1 (1)	2 (3)
Type 4	18 (26)	9 (13)	9 (13)
Type 5	4 (6)	2 (3)	2 (3)

Percentage in parentheses

There was a significant difference (Fisher's Exact test; p=0.001, d.f=4) between the number of male elephants and female elephants falling into the five different types of spinal conformation. The number of males falling into types 1, 4 and 5 spinal conformations was higher than the number of females showing such configuration. On the other hand, females out numbered the males in Type 2 spinal conformation.

DISCUSSION

Two sub species of Asian elephant (*Elephas maximus*) are described in Sri Lanka. One sub species (*Elephas maximus sinhaleyus*) has already become extinct. The other (*Elephas maximus maximus*) is on the verge of extinction unless effective measures of conservation are implemented. Therefore, scientific documentation of any data related to the living sub species is important (Ratnasooriya and Fernando, 1992).

This is the first study conducted in Sri Lanka describing the spinal conformation and their distribution in domesticated Sri Lankan elephants (*Elephas maximus maximus*). In this study, the spinal conformation was investigated in 140 domesticated elephants representing about 40% of the total domesticated elephant population in Sri Lanka (Jayewardene, 1994). We believe that this is a sizeable number representing the domesticated elephant population of Sri Lanka.

The results show that the five types reported for Burmese timber elephants by Gale (1974) are also present in Sri Lanka. The majority of the elephants (36%) showed Type 4 spinal conformation and 4% of elephants showed Type 3 spinal conformation. In males, most had Type 4 spinal conformations and in females most had Type 2 spinal conformation. It was found that the spinal conformations were significantly different between males and females. In males, most Athas (males with tusk) had Type 1 and most Aliyas (males with tushes) had Type 4 spinal conformations. On the other hand, in females most Athinna (females with tushes) and most Alidenas (females without tushes) had Type 2 spinal conformations. Another interesting finding of the study was the observation that the male elephants displayed more variation in their spinal conformation than the females.

Very few elephants of either sex had the Type 3 spinal conformation. It is claimed that elephants having this conformation are unreliable, bad tempered, not easy to work, and are often considered to be killer elephants (personal communication with mahouts and elephant owners). Elephant owners are reluctant to keep elephants with type 3 conformation and perhaps this could be the reason why very few elephants with this configuration were encountered in this study. Unfortunately, we cannot compare the results of this study with other studies conducted in Sri Lanka (Deraniyagala, 1955) or any other country (Ferrier, 1947; Gale, 1973) as these studies lack quantitative data.

In conclusion, the data of the present study shows that there is clear variation in the spinal conformation of male and female domesticated elephants in Sri Lanka. This variation was more prominent among the male elephants. It is likely that the variation in the spinal configuration are genetically determined, but nutritional status and the nature and the load of work may also play a role. Further, it may be worthwhile to investigate whether there is any relationship between the spinal configuration of the Sri Lankan elephant and their caste system described in Gaja Sasthra by Deraniyagala (1955).

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