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Prevalence of wound infection in wild and captive elephants (*Elephas maximus*) of Assam

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Abstract

A total number of 163 elephants were examined during one year (March, 2017 to April, 2018) consisting 24 wild and 139 captive elephants. The prevalence of wound infection in wild and captive elephants was 25.00% and 28.78% respectively, with an overall prevalence of 26.89%. However, the highest prevalence (46.15%) was recorded in private elephants. Age wise prevalence was highest in 31-40 years of age group (42.85%). The prevalence of wound infection was highest in female of private captive elephant (50.00%) followed by departmental captive elephant (25.00%). In wild elephant the wound infection was higher in male elephant (31.25%) than female (12.50%). The prevalence of wound infection in captive elephant was higher during winter season (39.28%) and lower in rainy season (7.50%). The higher prevalence was recorded in summer season (66.66%) in wild elephant but no wound infection in autumn season.

Keywords: Captive, elephant, koonkie, makhana, pilkhana, wound

Introduction

The Asian elephants hold an important ecological niche in North Eastern Region of India. The population of elephants includes both captive and wild as they are in constant touch with each other, thus they may be considered as critical vehicle for the spread of the infections from captive to wild and vice versa. The elephant population in Assam is approximately 5,719 as per 2017 census. Out of which there are about 140 departmental elephants all over the state of Assam. Infection caused by bacteria, virus, and parasite in elephants is reported by many workers in both Asian and African elephants. The wound occurs mostly due to ill designed, ill-fitting saddle, improper padding and chain or rope, burn during logging operation, prolonged use of improper designed saddle and sometimes during fight with wild elephants (Sarma, 2006)^[6]. Gogoi *et al.* (2017)^[3] has described the prevalence of bacterial dermatitis in captive Asian elephant (*Elephas maximus*) of Assam and recorded *Staphylococcus* species as the predominant causative organism. A comparative study was undertaken by Sajesh (2009)^[6] on traumatic injuries in the working elephant of Assam and Kerala based on sex, age, type of wound and bacterial involvement. The wound contain pus and their by it increases the surface area and sometimes it causes septicemia and systemic infection. In a study on wound and wound management Sukklad *et al.* 2006^[9] has recorded abscess (27.60%), injury from equipments (27.60%) accident (24.84%), inappropriate health management such as toxin, heat, sunburn, insects, ectoparasites and fungal infection (9.20%) intra species aggression (2.76%) surgical wound (8.00%) wound dressing (2.40%) remove small size mass (1.20%) tail amputation (0.96%) and episiotomy (0.56%).

Materials and methods

Sampling: The present investigation was conducted to study the prevalence of various wound infection in the representative captive and wild Asian elephant population of Assam. For isolation and identification of bacteria from abscesses and wounds, pus samples were collected aseptically with the help of sterile transport swab or by aspiration of the pus with the help of sterile syringe from the depth of the wound lesion of the affected elephants.

Culture and Identification: The collected samples were inoculated on Brain heart infusion (BHI) broth and brain heart infusion agar as described by Collins and Lyne (1970)^[11]. Inoculated plates were incubated at 37° centigrade for 24 hours aerobically. bacterial

After incubation, colonies showing different colony morphology were studied. Smears from respected colonies grown on brain heart infusion agar plates were stained by Gram's staining method for examination of their morphology and staining characteristic. Gram negative bacteria were grown in MaConkey Lactose Agar (MLA) and Eosin Methylene Blue Agar (EMB) for further identification. Gram positive organism like staphylococci was grown in Mannitol salt agar. Organisms were identified on the basis of their colony morphology, staining characteristics and biochemical tests (Cruickshank *et al.* 1975) [2]. For purification of bacteria a well separated single colony was picked up from the BHI plates and subcultured on fresh nutrient agar plates for purification. The newly subcultured plates were incubated at 37° centigrade aerobically and the process was continued until the subculture was considered as pure.

3. Results and Discussion

The prevalence of wound infection in wild elephant was 25.00% and in captive elephant 28.78% with the overall prevalence of 28.22% out of 163 elephants examined of which 24 were wild and 139 captive.

The prevalence of wound infection in departmental captive elephant was 22.00% (Table 1). However, the highest prevalence (46.15%) was recorded in private owned elephant. The lower prevalence of wound infection was recorded in Kazironga National Parks and wildlife sanctuary might be due to expert mahout, relatively better care, hygiene pilkhana,

better supervision and living condition (Sarma *et al.* 2006) [6]. Whereas in Laokhowa wildlife sanctuary the prevalence was highest as there were only two elephants and both of them were affected, which might be due to excess work load and poor management as well as the lesser in number. However in SonaiRupai wildlife sanctuary no wound was recorded. Age wise prevalence was highest in between 31- 40 years age group (42.85%) and no wound infection was recorded in the age group of 51 and above (Table 2). The higher wound infection in elephants might be due to excessive departmental works, tourism, koonkie, transportation and logging etc. The lowest wound infection was encountered in Center for Wildlife Rehabilitation and Conservation (CWRC, Bokakhat) that may be due to good management and better veterinary service. The calves which rescued by CWRC during flood were suckling and chances of infighting among themselves were very less, hence the prevalence was very low.

Sex wise prevalence of wound infection was highest in female of private captive elephant (50.00%) followed by departmental captive elephant (25.00%). But in case of wild elephant the wound infection was higher in male (31.25%) than female (12.50%). The number of wound in male is more due to bull fighting in wild elephant which is more common among makhana and tusker for which lesser percentage of wound was recorded in female.

Season wise prevalence of wound infection in captive elephant was higher during winter season (39.28%) and lower in rainy season (7.50%).

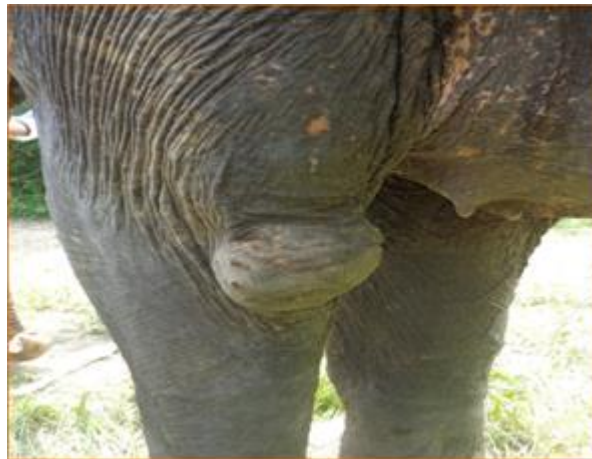


Fig 1: Wound in Elbow



Fig 2: Wound in Neck



Fig 3: Wound in stifle region



Fig 4: Wound in shoulder



Fig 5: Wound in tail region



Fig 6: Wound in carpal region

Table 1: Prevalence of wound infection in departmental captive elephant

Place	No. of elephant examined			No. of elephant affected			Prevalence (%)
	Male	Female	Total	Male	Female	Total	
Kaziranga National Park	16	20	36	1	0	1	2.77
Nameri National Park	4	6	10	2	3	5	50.00
Pobitora Wildlife Sanctuary	6	3	9	0	3	3	33.33
Orang National Park	7	10	17	2	3	5	29.41
Manas National Park	7	15	22	2	4	6	27.27
Laokhowa Wildlife Sanctuary	1	1	2	1	1	2	100.00
SonaiRupai Wildlife Sanctuary	1	3	4	0	0	0	0.00
Overall			100			22	22.00

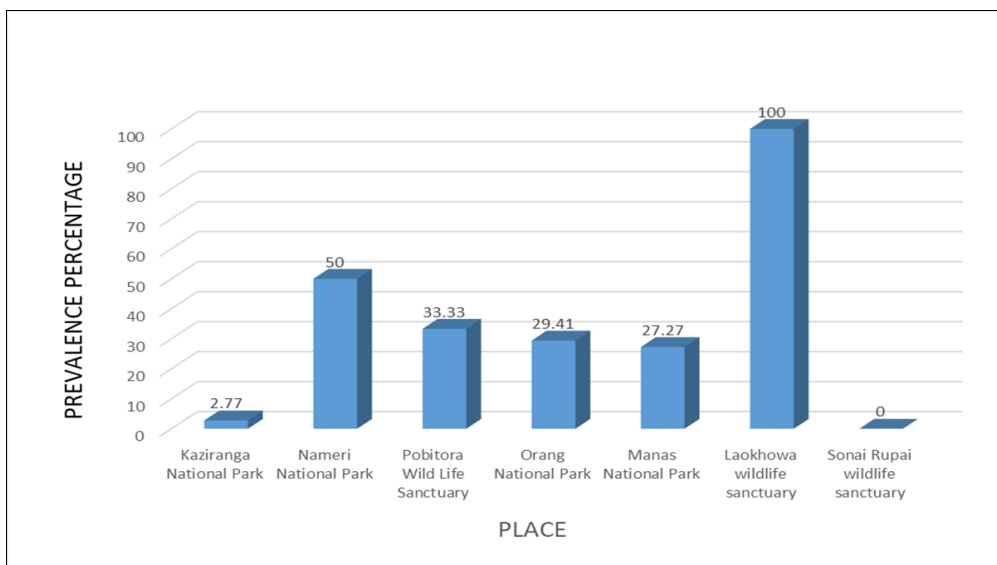
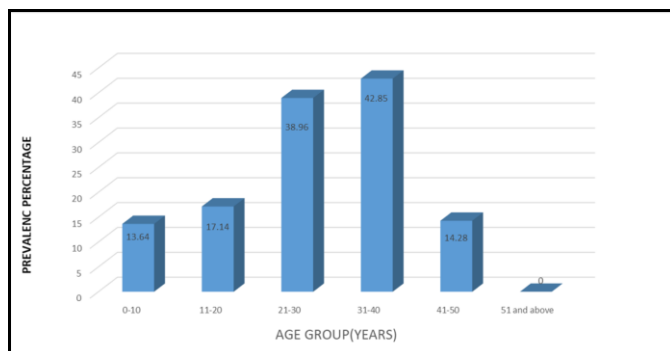


Fig 7: Graphical representation of wound infection in departmental captive elephant

Table 2: Age wise prevalence of wound infection

Age Group (Years)	Total No. of elephant Examined	No. of elephant affected	Prevalence (%)
Less than 10	22	3	13.64
11-20	35	6	17.14
21-30	77	30	38.96
31-40	14	6	42.85
41-50	7	1	14.28
51 and above	8	0	0.00
Total	163	46	28.22

**Fig 8:** Graphical representation of age wise prevalence of wound infection in elephant

Whereas, in wild elephant the higher prevalence was recorded during summer season (66.66%) and no wound infection was recorded in autumn season. The highest percent of wound infection in summer and rainy season might be due to increase in fly (*Musca Spp.*) population. In summer and during rainy season, national park and wildlife sanctuary remain submerged in flood water hence they are more likely to get injured during flood. The summer and rainy seasons are considered as breeding season of wild elephants; hence the chances of wound infection is more during that period due to infighting among the males. The wound infection during rainy season was 7.50 percent which might be due to the less work load and strict supervision of elephants in national parks and wildlife sanctuary. From the different types of wound both pure and mixed isolates of *Staphylococcus* and *Streptococcus* species with highest mixed isolates of *Staphylococcus* and *Pseudomonas* species, *Streptococcus* and *Pseudomonas* species as well as *Streptococcus* and *Klebsiella* species were recorded. Among the pure isolates, highest number of isolates were of *Staphylococcus* followed by *Streptococcus*, *Pseudomonas*, *Escherichia coli*, *Klebsiella* and *Enterobacter* species. All together a total of 55 different bacterial isolates were recovered with highest prevalence of *Staphylococcus* species (45.45%), followed by *Streptococcus* species (27.27%), *Pseudomonas* species (14.54%), *Klebsiella* species (5.45%), *Escherichia coli* species (5.45%) and *Enterobacter* species (1.81%). The above mentioned bacterial species were also recorded by Mikota *et al* (1994)^[5], Shrestha and Gairhe (2006)^[8] and Gohain (2016)^[4].

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