

Survey Study of Bacterial Flora of Asiatic Lion (*Panthera leo persica*)

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Introduction

Many bacterial diseases are reported from large felids, associated with bacteria inhabiting the rectal, oral or nasal cavities of both diseased and healthy wild and domestic animals (Lewis, 2000); some are also present in food and water. Bacterial infections may flare up, become pathogenic and produce disease in host animals under certain circumstances, for example due to stress. There is a dearth of information concerning the normal bacterial flora of the gastrointestinal and respiratory system of large felids, and this study provides some of this potentially valuable information.

Material and Methods

Samples were collected from 12 lions (6 male and 6 female) belonging to Sakkarbaug zoo, Junagadh. Swab samples were collected aseptically with all due precautions into transport media from rectal, oral and nasal cavities of twelve lions, and analysed for bacterial isolation/identification. An attempt was made to identify the isolated bacteria to the genus level; *E. coli* isolates were subjected to serotyping.

Result

The samples collected from rectal, oral and nasal cavity revealed various isolates, which are presented in Table-1.

Rectal swabs: All the rectal swabs (n=12) harbored at least one bacterial species. Four swabs showed single isolates, 6 showed two isolates and 2 swabs showed three isolates. In all, a total of 22 isolates were found from 12 rectal swabs. Seven bacterial genera were isolated: *Escherichia coli* (9), *Staphylococcus* spp. (4), *Aeromonas* spp. (4), *Shigella* spp. (2) and one isolate each of *Salmonella* spp., *Citrobacter* spp. and *Proteus* spp. *E. coli* serotypes isolated from rectal swabs were serotype rough, O2, O66, O26, UT, O157 and O22.

Oral Swab: In all 11 oral swabs were studied from the oral cavity of lions, of which 6 swabs showed one kind of bacteria, 2 contained two species and 2 three types, making a total of 16 isolates comprising 8 genera. The identified bacterial genera were: *Citrobacter* spp. (5), *E. coli* (3), *Salmonella* spp., *Staphylococcus* spp. (2 each), *Proteus* spp., *Shigella* spp., *Klebsiella* spp. and *Aeromonas* spp. Different serotypes of *E. coli* isolated were O22, O26 and O28.

Nasal Swabs: Swabs were collected from the nasal cavity of 7 leopards, of which 4 swabs contained one bacterial organism and the others contained mixed infection of 2 types of bacterial organism. In all a total of 10 bacterial isolates from 5 bacterial genera were isolated. The identified bacterial genera were *E. coli* (3), *Salmonella* spp. (2),

Staphylococcus spp. (2), *Proteus* spp. (2) and *Shigella* spp. (1). *E. coli* serotypes isolated from nasal swab were serotype O132, O162 and O106.

Discussion

Several species of bacteria can inhabit or localise to the gastro-intestinal and respiratory tracts of animals. The existence of such bacterial flora does not always indicate diseased status, since bacteria are often harmless to their hosts. They can become pathogenic under certain physiological circumstances, like stress, or when they colonise areas of the body that are not infected. Thus studies of normal bacterial flora associated with animals is useful for the interpretation of culture results obtained from clinical samples (Schotts, 1984).

Bacteria were present in all three cavities from which samples were obtained. *Escherichia coli* was the most common bacteria isolated from lions; of 48 bacterial isolates identified 15 (31.25%) were *E. coli*. *E. coli* is known to cause colisepticaemia in lion, tiger and leopard, with a wide range of symptoms involving the gastrointestinal tract (Wallach & Boever, 1983 and Lewis, 2000). The *E. coli* strains identified from lions were: 1) from the rectal cavity O₂, O₂₂, O₂₆, O₆₆, O₁₅₇ and an untypable; 2) from oral cavity O₂₂, O₂₆ and O₂₈, and 3) from the nasal tract O₁₀₆, O₁₃₂ and O₁₆₂. Thus a total of ten serotypes of *E. coli* were identified from lions. Some of the *E. coli* strains are pathogenic in nature and known to cause disease in lions (Goswami, 1994). Strains of *E. coli* reported from the stool samples of lion that were documented are O₅₈, O₆₂, and O₁₅₆ (Char *et al*, 1986). The present study revealed some newer and different strains of *E. coli* than reported earlier. In the present study, *Aeromonas* sp. was isolated from the rectal and oral samples but not from the nasal swabs of lions. Out of total isolates from lion, 8.33% were identified as *Aeromonas* sp. The organism is not known to cause serious disease in the animals. *Shigella* sp. is known to cause variety of symptoms like enteritis in wild animals including lions (Lewis, 2000).

In the present study 8.33% of the total bacterial organism from rectal, oral and nasal cavities of lions was identified as *Shigella* sp. Under stress condition these bacteria may flare up to cause enteritis, so stressors should be avoided for large felids in zoos. *Salmonella* sp. can cause zoonotic infection in a variety of domestic and wild animals, and also

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humans. Clyde *et al* (1997) demonstrated a high rate of faecal shedding of *Salmonella* organism in healthy lions. In the present study *Salmonella* was isolated from all three cavities of lions with a rate of occurrence of 10.42%. *Citrobacter* sp. was identified as causative bacteria from an Asiatic lion with signs of vomiting resulting to death, identified by culture characteristics and electron microscopy (David *et al*, 1993). In the present study the organism was isolated from the rectal and oral cavity of lions, and from a total of 48 bacterial isolates 6 (12.5%) were identified as *Citrobacter* sp. *Proteus* sp. had a rate of incidence of 12.5%. Goswami (1994) documented the organism from the post-mortem tissues of a debilitated Asiatic lion cub. *Klebsiella* sp. was found with the least occurrence in lion in the present study, as it was isolated from only one oral swab. The organism was documented from the internal organs of lion (Goswami, 1994). *Staphylococcus* sp. is reported as a common inhabitant of many organ systems of animals. In the present study the bacteria was isolated from all the three cavities of lions, with the overall rate of occurrence being 14.58%. *Streptococcus* sp. was comparatively less common as only 4.17% of the total bacterial isolates from lions were identified as *Streptococcus* sp. In all from 30 samples (12 rectal, 11 oral and 7 nasal) collected from lions, 48 bacterial isolates were recovered comprising nine bacterial genera.

Table: 1 Bacterial flora isolated from rectal, oral and nasal swabs.

SNo	Bacteria	Rectal swab	Oral swab	Nasal swab
1.	<i>Escherichia coli</i>	09	03	03
2.	<i>Aeromonas</i> sp.	03	01	00
3.	<i>Shigella</i> sp.	02	01	01
4.	<i>Salmonella</i> sp.	01	02	02
5.	<i>Citrobacter</i> sp.	01	05	00
6.	<i>Proteus</i> sp.	01	01	02
7.	<i>Klebsiella</i> sp.	00	01	00
8.	<i>Staphylococcus</i> sp.	04	01	02
9.	<i>Streptococcus</i> sp.	01	01	00

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