

## ORAL MICROBES OF PET SUGAR GLIDERS AND DETECTION OF *SALMONELLA* IN THEIR FAECES

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### SUMMARY

Clinically healthy pets may carry zoonotic pathogens and shed them, thus act as potential public health threat. Small, exotic animals are gaining popularity as pets which include iguanas, turtles and sugar gliders. Salmonellosis is an important disease affecting human and animal populations worldwide. It is reported that sugar gliders are becoming popular pets among young Malaysians, not only are they cute and adorable but are easily carried around. Of 35 pet sugar gliders and 17 from a breeder, 15% were positive for salmonellae and the serovars identified were *Salmonella enterica* serovar Albany (62.5%) and *Salmonella enterica* serovar London (37.5%). *Staphylococcus* spp. (41.0%) were most frequently identified from oral mucosae, followed by *Enterococcus faecalis* (17%), *Streptococcus viridians* (15.0%), *Acinetobacter calcoaceticus* (13.0%) and *Enterococcus faecium*, *Pasteurella* spp., *Staphylococcus delphini* and *Escherichia coli* (2.0–4.0%). The close interaction between infected pet sugar gliders and their owners poses public health risk. Breeders with infected animals present direct risk to pet shops and pet owners.

Keywords: Oral microbes, *Salmonella*, sugar gliders

### INTRODUCTION

Sugar gliders (*Petaurus breviceps*) are gaining popularity as exotic pocket pet in Japan, Canada and United States and currently this trend is showing in Malaysia. Sugar gliders are native to Australia, New Guinea and Indonesia. In the wild, the animals feed on gum and sap from acacias and eucalyptus as well as eating a range of arboreal insects. The animal is a nocturnal creature and feeding and foraging takes place after dusk. In captivity, the animals are fed dry pellets, fresh fruits, vegetables and insects such as mealworms and crickets; canned food that contains whole insects are reportedly available in the pet shops. The close contact between sugar gliders and the owners could expose them to zoonotic pathogens. The exposure of animals and humans to *Salmonella* is of public health concern; animals are usually healthy carriers although some may come down with diarrhoea. However, most humans are susceptible hosts and would showed symptoms of salmonellosis which include headache, malaise, nausea, fever, vomiting, abdominal pain and; salmonellae may cause serious infection when they invade intestinal mucosa, enter the bloodstream and cause septicaemia and death diarrhoea (Woodward *et al.*, 1997). Salmonellosis has been recognised in traditional pet animals, such as cats and dogs and many of them are regarded as member of the family. Today, there is an increase in pet ownership and an increasing number of exotic pets were observed to be infected with salmonellae; among these were turtles, terrapins, iguanas and hedgehogs.

Thus, a small study was done to determine if the sugar gliders, popular and exotic pets sin Malaysia, were colonised by zoonotic pathogens, in particular *Salmonella*. This is partly because previous studies had showed that apparently healthy pet animals may be infected with salmonellae.

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### MATERIALS AND METHODS

Fifty pet sugar glider owners were contacted to seek their consent to participate in the study; however, only 35 were willing to have their pet animals sampled. Only one breeder with 100 sugar gliders participated in the survey and 17 of his animals were sampled. The owners and the breeder were from areas around Klang Valley in Selangor. Each animal was gently restrained using a hand grasp technique with the aid of a towel wrap loosely around the animal body. Samples taken from each animal were oral mucosa swab and faeces (the rectum was gently wiped with moistened sterile cotton to stimulate defaecation); each sample was placed in an individual sterile container, pack in an ice box and brought to the Veterinary Public Health Laboratory in Faculty of Veterinary Medicine, Universiti Putra Malaysia for culture.

The oral swabs were cultured on Blood agar (Oxoid) and MacConkey agar (Oxoid) to isolate Gram positive and Gram negative bacteria respectively. All the different types of colonies obtained were subjected to appropriate biochemical tests to identify the Gram positive and Gram negative bacteria as described in Jang *et al.* (2008). Faecal samples were cultured to detect the presence of *Salmonella*. Each faecal sample was placed in Buffered Peptone Water (BPW) (Oxoid), incubated for 24 hr at 37°C for preenrichment; then one mL of each pre-enriched culture was transferred to an enrichment broth, Rappaport-Vassiliadis (Oxoid) and incubated at 42°C for 48 hr. two-three loopfuls of each enriched culture was then streaked onto Xylose-Lysine-Deoxycholate (XLD) agar (Oxoid) and incubated at 37°C for 24-48 hr. Presumptive *Salmonella* isolates were subcultured for purity and subjected to biochemical tests which included urease test, triple sugar iron agar (TSI), lysine iron agar (LIA) and sulphide indole motility (SIM) agar. Those isolates gave positive reactions to those tests were sent to Veterinary Research Institute in for serotyping according to Kauffmann-White Classification Scheme.

## RESULTS AND DISCUSSION

Eight of 50 (15.4%) faecal samples were detected positive for salmonellae and the serovars identified were *Salmonella enterica* serovar Albany (62.5%) and *Salmonella enterica* serovar London (37.5%). There is very scanty study on salmonellae in exotic mammal pets including sugar gliders. A case was reported by Woodward *et al.* (1997) in which five patients in Alberta, Canada were infected with *Salmonella tilene* from pet sugar glider and they also reported cases of salmonellosis associated with pet iguanas, turtles and hedgehogs. The owners indicated that once the animal bonds or is familiar with him / her, it is let loose to cling on his / her hand or “perch” on the shoulder. The sugar glider would defaecate, urinate or both on the hands while being handled, played with or carried around and they would allow the animals to lick their faces. Thus, the presence of salmonellae in these pet animals certainly pose a public health risk to owners, especially those with children upon handling, cuddling and possibly kissing these infected animals. Chomel and Sun (2011) reported that between 18.0% to 62.0% of pet owners would sleep with their pets and there were those that allowed the pets to lick their faces or kiss their pets which may expose them to the risk of acquiring zoonoses.

*Salmonella enterica* serovar Albany was reported as the most frequent serovar encountered in animals and livestock products in Malaysia in 2003 (Rohaiza *et al.*, 2006). Reports on foodborne salmonellosis are available, however, the authors were not able to obtain any report on salmonellosis transmitted from pets. Other bacteria isolated from faeces were *Enterococcus faecalis* (23.5%), followed by *Escherichia coli* (22.0%), *Staphylococcus* spp. (20.0%), *Klebsiella pneumoniae* and *Enterococcus faecium* (16.0% each) and *Staphylococcus delphini* (4.0%).

From the oral mucosae, *Staphylococcus* spp. (41.0%) were most frequently identified, followed by *Enterococcus faecalis* (17.0%), *Streptococcus viridians* (15.0%), *Acinetobacter calcoaceticus* (13.0%) and *Enterococcus faecium*, *Pasteurella* spp., *Staphylococcus delphini* and *Escherichia coli* (2.0–4.0%). These bacteria were common commensals in animals and humans, except for *Pasteurella* spp., *Acinetobacter calcoaceticus* and *Staphylococcus delphini* which are more common in animals whereas *Streptococcus viridians* are more common in humans. *Klebsiella pneumoniae* are known opportunistic pathogens. Several human infections caused by *Pasteurella* spp. were reported as a result of close contact with pets which include sharing a bed, being licked or kissing pet animals (Chomel and Sun, 2011).

According to the records of Wildlife and National Parks Department Malaysia (Perhilitan), there is an increase in the importation of sugar gliders and to date there are about 9000 animals registered with the department. Sugar glider is not a protected species in Malaysia; however, Perhilitan is considering to include the animal in the First Schedule of the Wildlife Conservation Act 2010 and the International Act 2008. The reasons being sugar glider is an exotic species in Malaysia and possibly to control their importation and the

ownership through licensing (Palanasamy, 2012). Moreover, breeders with infected animals may cause increasing numbers of salmonellosis if they are not made aware of the situation.

Thus, the close contact and frequent handling, cuddling and kissing sugar gliders with zoonotic pathogens and opportunistic organisms is of major public health concern especially in children, the elderly and immunocompromised persons. It is hope that relevant authorities regulate pet shops and breeders to ensure the welfare of the animals and that they are free of disease pathogens.

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## CONFLICT OF INTEREST

None of the authors have any potential conflicts of interest to declare.

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