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PATHOGENS ISOLATED FROM *Batagur affinis* (TUNTUNG SUNGAI) FROM CONSERVATION CENTRE FOR RIVER TERRAPINS IN 2014

SANTHI M.[1]*, SITI AMINAH Y.[1], NURAINI SIMAA A.[1], DONNY Y.[1], HARTINI I.[1], AZEMI H.[2], SHAHAZA O.[3], SIVANATHAN E.[1], RAHMAT T.[1] AND MISLIAH M.[1]

1 Department of Wildlife and National Parks, Cheras,

2 Conservation Centre for River Terrapins, PKHL Bukit Pinang, Kedah

3 Regional Veterinary laboratory, Bukit Tengah, Penang

* Corresponding author: santhi@wildlife.gov.my

Abstract. In 2014, a total of 16 river terrapins *(Batagur affinis)*, locally called *tuntung sungai*, died due to various causes and a post mortem was carried out. Complete diagnostic evaluation of parasitological and bacteriological findings were recorded. Significant parasitological findings consisted of seven terrapins showing presence of Ascarid (*Sulcascaris sulcata*) and Strongyle (*Oesophagostomum* sp.) worms in the gut contents. Strongyle and strongyloides eggs were detected using McMaster's method on faeces of 12 terrapins. Bacterial cultures from organs indicated the presence of *E. Coli, Staphylococcus epidermidis, Staphylococcus chromogenes, Aeromonas hydrophila (4+) dan E.Coli (4+).* This indicates that common parasites and bacteria are important in the conservation programmes for river terrapins and measures to curb the infection is highly recommended. Continuous data collection will enable its management and assessment in control programmes for a more effective conservation programmes.

Keywords: Batagur affinis, gastro intestinal helminthes, river terrapin

INTRODUCTION

The *Batagur affinis* or southern river terrapin are commonly found in the rivers of Cambodia, Myanmar, Thailand and Malaysia. In Malaysia, it is called "tuntung sungai", and the rivers of Kedah, Perak and Terengganu are major nesting grounds though the population continues to dwindle despite conservation efforts undertaken by Malaysian Wildlife Department for over 20 years (3). One of the main reasons for the reduction in terrapin numbers is due to the threat of human activities such as overharvesting of adults and eggs coupled with habitat degradation. In efforts to maintain and increase the population of these terrapins, studies on breeding, management and

environmental investigations into the nesting sites have been undertaken.

According to Ernst *et al*.,2000; *B. affinis, B. baska*, and *B. borneoensis* are the only species living in tidal, brackish areas of the estuaries of medium and large rivers. Rhodin *et al*., 2010 reported that there are two subspecies of *Batagur affinis* namely *Batagur affinis affinis* and *Batagur affinis edwardmollis*. Terrapins are prone to bacterial and parasitic infections due to malnutrition and poor hygiene as they tend to become readily infected because of the polluted or contaminated aquatic environments. Common gastrointestinal parasites such as *Sulcascaris sulcata* have been recorded (5). An adult male measures about 9 cm long whereas a female is about 11 cm long and can be found in the stomach of terrapins. The terrapins are the definitive hosts while scallops and other mollusks are intermediate hosts, generally consumed by the terrapins. Eggs pass out in the faeces of infected terrapins and fall to the sea or river floor. The larva develops in the egg and undergoes 2 molts to the third larval (L3) stage. The L3 hatches from the eggs, beginning at 7 days after the egg is laid. The L3 are taken up by mollusks (scallops and possibly others) and go to the tissues. The L3 will molt to the L4 in the scallop in 3 to 4 months. When the infected mollusk is eaten by the terrapin, the L4 attaches to the stomach wall (at the esophago-gastric junction) and will molt to the adults in 7 days. Adults will become gravid in 5 to 6 months and produce eggs which will contaminate the aquatic environment. Apart from this, *Oesophagostmum* sp. and *Trichostrongylus* sp. also have been reported in turtles and terrapins. As for bacterial infections, *Pseudomonas* or *Aeromonas* related infections are common, also due to the contaminated aquatic environment (6).

One of the crucial factors which can affect the productivity of terrapins are the diseases or infections which cause morbidity and mortality. In this regard, the Terrapin Conservation Centre in PKHL Bukit Pinang consistently monitors all mortality cases by sending dead terrapins for post mortem and disease investigations in order to elucidate the common infections in terrapins. This information is vital in formulating control programmes to prevent future infections and diseases as well as create awareness on the common infections in terrapins. Thus, this report is a collation of information from post mortem cases of *Batagur affinis* from the Conservation Centre for River Terrapins submitted for disease investigation and cause of death in 2014, conducted by the Regional Veterinary Laboratory, Bukit Tengah.

MATERIALS & METHODS

Management

The total population of the terrapins in Wildlife Reservation Centre Bukit Pinang is 494 and they are kept in an individual pond within same age group. There are total of 9 individual ponds in the Wildlife

Reservation Centre. Newly hatched terrapins are grey in colour and each weighs around 100-120 g with a carapace length of 6-7 cm. Terrapins are fed with vegetation (*kangkung*), fish, banana and pellets. The water supply for the Centre is from tap water. The terrapins are routinely given anthelmintics (fenbendazole).

Post mortem

Routinely, the management of the Conservation Centre will submit cases of mortality to the Regional Veterinary Laboratory, Bukit Tengah. In the year 2014, 16 terrapins were received and autopsies carried out. Samples were collected for bacteriological and parasitological examination based on the gross pathological findings.

Laboratory diagnosis

Parasites found in the gut were put in alcohol and identified based on taxonomy (1, 5). Faecal samples were analysed

Table 1. Results of Parasitological and bacteriological findings in 16 Terrapins from PKHL Bukit Pinang

No.	Helminth	Strongyle epg	Strongyloides epg	Bacteria
1	*Sulcascaris sulcata*	800	0	NSF
2	*Oesophagostomum*	0	0	NSF
3	*Oesophagostomum* (1 worm)	0	0	NSF
4	*Sulcascaris sulcata* (32 worms)	0	0	*Aeromonas hydrophila & E. coli*
5	NSF	1100	100	NSF
6	NSF	200	0	NSF
7	NSF	300	100	NSF
8	NSF	500	200	NSF
9	NSF	800	300	NSF
10	NSF	500	900	NSF
11	NSF	100	0	NSF
12	NSF	4300	400	NSF
13	NSF	900	500	NSF
14	*Sulcascaris sulcata* (12 worms)	2200	0	*E. Coli, Staphylococcus epidermidis, Staphylococcus chromogenes*
15	*Sulcascaris sulcata* (14 worms)	800	0	*E. Coli, Staphylococcus epidermidis, Staphylococcus chromogenes*
16	*Sulcascaris sulcata* (26 worms)	0	0	*E. Coli, Staphylococcus epidermidis, Staphylococcus chromogenes*

using the McMaster method (2) to identify helminthic ova. Bacteria was cultured (7) from organ specimens.

RESULTS

Table 1 shows the pathogens isolated from 16 terrapins. The helminth worms found in the terrapins are *Sulcascaris sulcata,* recovered in 5 terrapins (1-32 adult worms); and *Oesophagostomum* sp. from one terrapin. The faecal examination revealed strongyle ova (0-4,300 epg) in 12 terrapins and strongyloides ova (0-900) in 7 terrapins.

Bacteriological cultures showed the presence of the following pathogens; *E. Coli, Staphylococcus epidermidis, Staphylococcus chromogenes, Aeromonas hydrophila (4+) dan E.Coli (4+)* in four terrapins. These are common pathogens in the aquatic environment.

Figures 1 and 3 shows the presence of worms in the gut of the terrapins after post mortem. The heavy infection of worms impacting the stomach was observed. On cutting open part of the intestines, several worms were found to be coiled up thus blocking the passage of food.

DISCUSSION AND CONCLUSION

River rerrapins were once abundant in the major river systems of South and Southeast Asia, from the Mekong to the Ganges. However, a variety of human activities now threaten the survival of these large turtles. Five of the six species in the genus

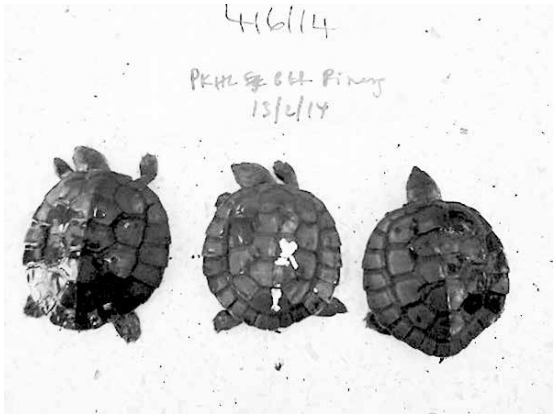

Figure 1: River Terrapins (*Batagur affinis*) before postmortem

Figure 2: Stomach of river terrapin filled with helminths

Figure 3: Digestive system filled with worms

Batagur are ranked critically endangered by the IUCN Red List and face imminent extinction. Batagur eggs are widely harvested for domestic consumption every year, a process made easier because females congregate every year at about the same time to deposit eggs at known beaches and sandbars. Large adults are also harvested for food. Nesting females, the most important segment for sustaining the population, make up the majority of this catch as they are easy prey when they emerge to lay eggs. In order to help conserve Batagur populations, the nesting beaches are the focus in the conservation efforts. Monitoring nesting beach activity is generally the only opportunity to determine wild population numbers. The annual emergence of females to lay eggs, on well-known and often historic nesting beaches, is the most vulnerable stage of their annual life cycle, and it is here where protective conservation measures have proven the most effective. Apart from this, raising hatchlings in captivity until they are large enough to escape predation, is being used successfully in Batagur conservation programmes in India, Myanmar, and Cambodia. (8)

Reducing morbidity is another method of increasing the population of terrapins. As such, identifying infections and carrying out treatment as well as practicing good management at conservation sites will ensure terrapins are healthy with reduced common infections. Terrapins inhabit rivers and riverine areas in the tropics and subtropics filled with thick vegetation, sharing their habitat with many other reptiles and amphibians. In such a habitat, infections are easily transmitted, such as bacterial and parasitic infections. As a result, it is common to find *Strongyles* and *Strongyloides* infections in terrapins, as a result of consuming plants and vegetation contaminated with these *strongyle* larvae. The faecal egg counts for *strongyles* too was more than 500 epg for 9 terrapins. *Strongyles* too can damage the intestinal wall causing poor digestive function and loss of weight apart from protein leak resulting in dehydration and weakness. Fenbendazole at 25 mg/kg once every second week for 8 weeks can be administered.

Generally, most species of river turtles have an omnivorous diet that is primarily made up of aquatic plants, grasses and leaves. Many river turtle species also hunt fish and mollusks in the water along with small reptiles and amphibians. Thus it was observed that large numbers of *Sulcascaris sulcata* were found in terrapins. Worms may aggregate and cause ulceration of the stomach with almost complete destruction of the upper layer of mucosa. This can lead to poor appetite and death.

Depending on the species, female terrapins lay between 5 and 100 soft, leathery eggs each time which it then buries in the sand. After a couple of months, the hatchlings head for the water. The average lifespan of the river turtle is about 30 years (Orenstein, 2001). Thus, it is important that the terrapins are healthy in order to produce eggs with the best

chance of hatching. Terrapins also perform cloacal respiration apart from pharyngeal respiration, and aestivation and brumation (burying in sand) and these pose an added risk to getting infections from the ground. Common infections include shell rot, salmonellosis and pneumonia caused by a variety of common bacteria. Antibiotic therapy can be instituted for group or individual terrapins.

In conclusion, the information gathered from the 16 terrapins that were autopsied gives an indication of the possible types of pathogens found in terrapins. This gives better awareness to veterinarians and conservation site managers on the care and management of terrapins so as to maximize the productivity to improve the population. A gradual and consistent recording of this information will definitely be useful for future generations, in helping to conserve wildlife holistically.

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