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Review of Ivermectin Treatment on Exotic Animals.

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Introduction

Parasitism is an interaction of species populations in which one typically smaller organism, known as the parasite lives in or on another, known as the host. Parasites come from a wide variety of animal groups, including but not limited to viruses, bacteria, platyhelminthes (flatworms), nematodes (roundworms), and arthropods (ticks, lice, mites, fleas). The parasite obtains food, shelter, or other requirements from its host. Parasitic infection among the animals is a significant challenge in veterinary world. The infection may be due to poor hygienic condition, improper animal waste management, ingestion of food that contains the parasites.

Parasitic infection in exotic animals has become a main concern to veterinary. Pet owners should be educated in the proper care, management and husbandry of the species kept. Ivermectin is a broad spectrum drug for both ectoparasites and endoparasites with exception of intestinal protozoa and cestodes.[1]

Methods

Study Design

This study is an experimental and qualitative study. It focused on ivermectin treatment on treating parasitic infection in exotic animals. This study specifically used ivermectin as anti-parasitic agent. This study analyzed the effect of ivermectin on exotic animals by investigating its efficacy and toxicity to have a correct dosage regimen for each species. Ethic approval for the present study was obtained from UiTM Care (Committee on Animal Research and Ethics).

Study location

This study was conducted at Exotic Animal Veterinary Practice, Taman Melawati, Kuala Lumpur and Farm in The City, Seri Kembangan, Selangor. The pet's owners were mainly from the Klang Valley to seek medical treatment.

Selection Criteria

The exotic species were medically examined and selected for ivermectin administration.

Method of Administration

Before the treatment, the exotic pets were examined for clinical signs o parasitic infection. The animals were weighed to determine the dosage. Ivermectin was administered to the animal through either oral, subcutaneous injection or external application base on the species. In pet birds weighing less than 100 g, ivermectin was diluted in propylene glycol (50:50 v/v).The efficacy of ivermectin was evaluated by the absence of parasitic infection. Toxicity of ivermectin was exhibited by the presence of anorexia, hypersalivation, lethargy and depression. It is fatal in chelonians.

Study Period
The study was carried out between September 2016 and June 2017.

Research Instruments
The research used ivermectin treatment records filled by Associate Professor Dato' Dr. S. Vellayan. Data in the records includes the species of exotic animals, dose of administration, route of administration, efficacy and toxicity of Ivermectin.

Data Analysis
The data was analyzed by using SPSS 23.0.

Results

Exotic pets treated with ivermectin

In this study, 20 exotic animals were treated with ivermectin for parasitic infection. This included mammals (45%; 9 samples), birds (40%; 8 samples) and reptiles (15%; 3 samples). The African grey parrot and hedgehog were the most treated animals about 15% (3 samples out of 20 samples) for each species followed by ferrets, sugar gliders and budgerigars about 10% (2 samples from each species). The other species were only 1 sample each (Figure 1).

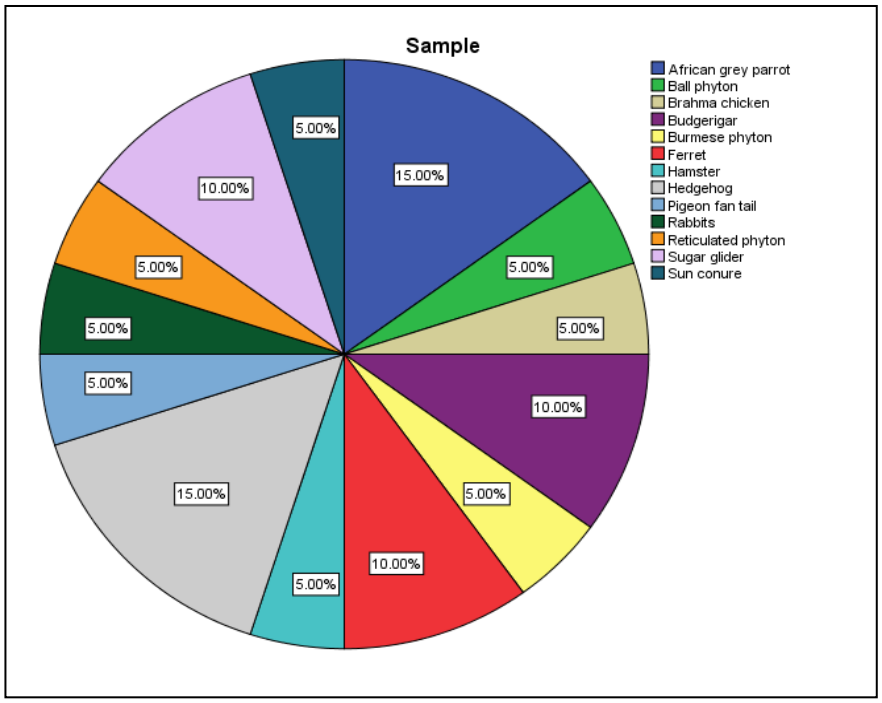

Figure 1: Percentage of the exotic pets treated with ivermectin.

Action of ivermectin

Eighty five percent of type of infection was ectoparasites (mites) and other 15% was endoparasites. Seventeen animals were treated for ectoparasites. Three snakes namely, Burmese python, Ball python and Reticulated python were treated for endoparasites.

Efficacy of ivermectin

Figure 2 shows the dose, application frequency and treatment duration of ivermectin. For the dose, mean values were 0.3 ml, 0.15 ml and 0.5 ml for mammals, birds and reptiles, respectively. Three species showed the similar frequency of application which was 3 times during treatment. However, in birds, there was slight deviation. The mean values for duration of treatment were 18.67 (19 days), 15.63 (16 days) and 17.33 (17 days) for mammals, birds and reptiles respectively. The deviation of value was dependent on the severity of infection itself.

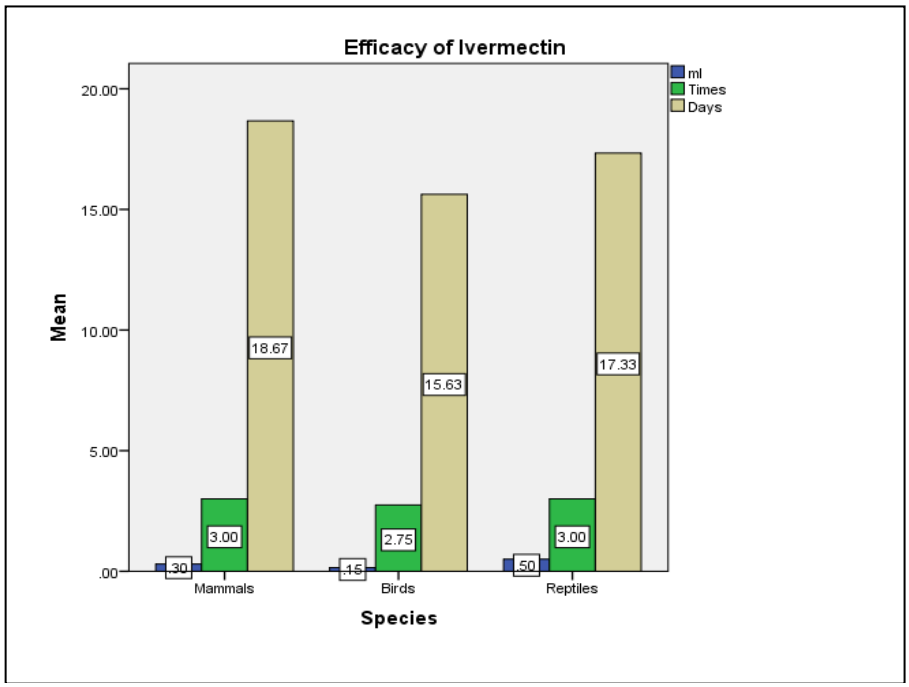

Figure 2: Mean values of dose, frequency of application and treatment duration for the each exotic species.

Incidence of ivermectin toxicity

Only one occurrence of toxicity was observed during the treatment of sun conure bird.

Discussion

In 1973, actinomycete, *Streptomyces avermectinius* was isolated from Japan soil. The partnership between Kitasato Institute (Japan) and Merck, Sharpe and Dohme (MSD) research laboratories (United States) had led to the discovery of a powerful antiparasitic drug called ivermectin. During 1973 – 1974, the extensive identification of parasitic activity through screening systems had been done.[2] First testing in mouse model was experimented at MSD facilities and antihelminthic activity was discovered in 1974 -1975.[3] Ivermectin was firstly marketed into veterinary practice in 1981. It became a best-seller due to endoectocide properties. Ivermectin had a major impact to the parasitic control in livestock and human-companion veterinary practice.[4] Currently, there are many products of Ivermectin have been introduced into the market such as Biomectin® (Vetoquinol, Poland), Ivomec® (Merial, Brazil), Kelamectin® (Kela, Belgium), Itin Vet® (KM Vet Pharm, Malaysia), Imectin® (International Pharma Lab, Pakistan) and Stromectol® (Merck, USA).

In the present study, most of exotic pets were treated for infection due to ectoparasites. Ferret (*Mustela putorius furo)* was treated for ear mite infection, (*Otodectes cynotis*).[5] Hedgehog (*Atelerix albiventris)* was treated for *Caparinia tripilis* mites. Rabbit was treated for ear mite infection, *Psoroptes cuniculi.*[6] Birds were mostly treated for scaly leg mite infection, *Cnemidocoptes pilae*. Ivermectin also used in treating endoparasitic infection in snakes. Ball python, Burmese python and Reticulated python were treated for nematodes. Ivermectin is contra-indicated in chelonians and lizards due to its toxicity and leads to mortality.

Efficacy of Ivermectin was evaluated by the absence of parasitic infection. For ectoparasites, the clearance of mites at the exotic pets. For endoparasites, presence of negative ova in the feces. The mean dose for mammals is 0.3 ml. The dose was still in the range of dose regimen, 0.2 – 0.4 mg/kg. The mean dose for birds is 0.15 ml and it also was still in the range of dose regimen 0.2 – 0.4 mg/kg. However, sun conure bird experienced overdose and led to toxicity. For the reptiles, mean dose, 0.5 ml was in dosage regimen, 0.2 mg/kg.[7] Three time application of ivermectin were administered to all species. The duration of treatment ranges from 14 to 21 days for all species.

Toxicity of ivermectin can be characterized by these symptoms namely anorexia, lethargy, hypersalivation, depression and the worst paresis that led to fatality. Toxicity in chelonians were exhibited by paresis and death.[8] In this study, overdose of ivermectin was noticed in sun conure which led to toxicity.

Toxicity was treated by oral administration of 5 ml fresh pineapple juice (Vellayan, personal communication, 2017). Simultaneous administration of ivermectin through topical and subcutaneous injection lead to toxicity.[9] Ivermectin is also contraindicated in lactating animals.

Conclusion

Ivermectin is a broad spectrum drug for treatment of both ectoparasites and endoparasites in exotic pets. The dose, frequency of application and treatment duration varies among the species and the degree of infection. However, the dark side of ivermectin which was its toxicity to some species such as chelonians also needed to put as a priority during the treatment. The use of fresh pineapple juice in treating toxicity needs further biochemical evaluation.

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