SHORT COMMUNICATION
Open Access

Journal of Veterinary and Animal Sciences
ISSN (Print): 0971-0701, (Online): 2582-0605
https://doi.org/10.51966/jvas.2023.54.1.226-228

Prevalence of endoparasitic infection in captive macaques in Kerala zoos

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Citation: Livin Raj,V.L., Biju,S., Mathew,J. and Zarina,A. 2023. Prevalence of endoparasitic infection in captive macaques in Kerala zoos. *J. Vet. Anim. Sci.* **54**(1):226-228
DOI: https://doi.org/10.51966/jvas.2023.54.1.226-228

Received: 16.03.2022 *Accepted: 28.11.2022* *Published: 31.03.2023*

Abstract

The study was conducted in three macaque species namely Lion-tailed macaque (Macaca silenus), Rhesus macaque (Macaca mulatta) and Bonnet macaque (Macaca radiata) in the zoos of Kerala. Faecal samples were collected from individual macaques kept in open enclosures and retiring cages. The samples were examined by sedimentation method for assessing the endoparasitic infection and its prevalence percentage in captive macaques. The degree of infection was assessed by faecal egg counts of samples by McMaster technique. The study found zero prevalence of strongyles in Lion-tailed macaques; 20 per cent in Rhesus macaque and 100 per cent in Bonnet macaques. The eggs per gram of strongyles in Rhesus macaques were 100 ± 39.22 and in Bonnet macaques were 312 ± 47.94. The prevalence of coccidia was 16.6 per cent in Lion-tailed macaques; 40 per cent in Rhesus macaque and 100 per cent in Bonnet macaques. The oocysts per gram of coccidia in Lion-tailed macaques were 166 ± 98.88; in Rhesus macaques were 200 ± 89.44 and in Bonnet macaques were 1850 ± 53.54. The present study revealed the higher prevalence and degree of infection of coccidia and strongyles in Bonnet macaques when compared to the other two macaque species.

Keywords: *Lion-tailed macaque, Rhesus macaque, Bonnet macaque, eggs per gram*

In animals kept in captive condition in zoos, occurrence of parasitic diseases will differ according to the type of husbandry and prophylactic measures (Tabasshum *et al*., 2018). Control of endoparsitic diseases is crucial since chance of reinfection even after antihelminthic therapy is more due to stress and close proximity of group housed animals (Varadharajan and Kandasamy, 2000).

**Forms part of the M.V.Sc thesis submitted by the first author to Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala.*

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High prevalence of 100 per cent *Trichuris* and 50 per cent coccidia was reported in Rhesus macaques at Dhaka zoo (Raja *et al*., 2014). Faecal egg counts of free living Rhesus macaques range from 100 to 2000 with mixed infection of strongyles and coccidia (Arunachalam *et al*., 2015). Identifying the sources of stress and adopting remedial measures are important to enhance the immunity of animals and thus to resist parasitic diseases. In the present study we assessed the prevalence and degree of infection of endoparasites in Lion-tailed macaque, Rhesus macaque and Bonnet macaques kept in captivity in zoos in Kerala. The study was conducted at the government owned Zoological gardens at Thiruvananthapuram and Thrissur in Kerala State administered by the Department of Museum and Zoos. Fresh faecal samples of 20g were collected in polythene lock covers from Lion-tailed macaque, Rhesus macaque and Bonnet macaques, were stored and transported in an ice box to the laboratory. The samples were examined for parasitic ova or oocyst by direct microscopic method and sedimentation method in department of Veterinary Parasitology, College of veterinary and animal sciences, Mannuthy. Faecal egg counts of faecal samples were done by McMaster technique for eggs per gram (EPG) and oocyst per gram (OPG) (Cringoli *et al*., 2010).

The endoparasites detected in the macaques in captivity were coccidia in all the three macaque species and strongyles in case of Rhesus macaque and Bonnet macaque. The eggs per gram (EPG) of strongyles and oocysts per gram (OPG) of coccidia in macaques are presented in tables 1 and 2 respectively.

Higher prevalence (100 per cent) of both coccidia and strongyles were observed in Bonnet macaques in Thrissur Zoo in the present study. A prevalence of 25 per cent

Table 1. Eggs per gram of strongyle in macaques

Species	Eggs/gram
Rhesus macaque	100 ± 39.22
Bonnet macaque	312 ± 47.94

Table 2. Oocysts per gram of coccidia in macaques

Species	Oocysts/gram
Lion-tailed macaque	166.66 ± 98.88
Rhesus macaque	200 ± 89.44
Bonnet macaque	1850 ± 53.54

strongyles was reported by Varadharajan and Kandasamy (2000) in group housed Bonnet macaques. The higher prevalence reported in Bonnet macaques in Thrissur Zoo may be due to the group housing of large number of animals in limited space wherein chances of reinfection through faecal-oral route are more. However, individual housing was followed for Rhesus macaque and Lion-tailed macaque in Thiruvananthapuram Zoo. Prevalence of strongyles in Rhesus macaque was 20 per cent and coccidia was 40 per cent in the present study. Sharma *et al*. (2013) reported 55.42 per cent prevalence of strongyles in Rhesus macaque in free-ranging conditions. Raja *et al*. (2014) reported 50 per cent prevalence of coccidia in Rhesus macaque at Dhaka Zoo. Also the prevalence of coccidia in Lion-tailed macaques was only 16.6 per cent in the present study. Thus, wide variation exists in prevalence per cent of endoparasites depending on factors including housing in captivity or also based on prevailing climatic factors. The parasitic control is crucial part of zoo preventive medicine program. Under captive environment they are vulnerable to endoparasitic diseases, and so antiparasitic drugs should be given under supervision of veterinary doctor (Meredith, 2021).

In assessing the endoparsitic load, Bonnet macaques recorded higher infection in case of strongyles (EPG 312 ± 47.94) as compared to Rhesus macaque (EPG 100 ± 39.22). The coccidia infection also was much higher in Bonnet macaque (OPG 1850 ± 53.54) as compared to the Lion-tailed macaque (OPG 166.66 ± 98.88) and Rhesus macaques (200 ± 89.44). This might be due to more chances of reinfection in group housed Bonnet macaques. A wider range of eggs per gram ranging from 100-2000 (Arunachalam *et al*., 2015) and 77-1503 (Tabasshum *et al*., 2018) was reported in Rhesus macaques. The oocyst per gram of

coccidia reported by Raja *et al*. (2014) was 600-800 which was higher than the oocyst per gram reported in Lion-tailed macaque and Rhesus macaque in Thiruvananthapuram Zoo, but much lower than the oocyst per gram reported in Bonnet macaque in Thrissur Zoo. The degree of infection also thus showed wide fluctuations due to different factors influencing chance of reinfection and the stressors around.

Summary

The present study revealed high prevalence per cent of strongyles and coccidia in Bonnet macaques with a higher parasitic load. Individual housed macaques like Lion-tailed macaque and Rhesus macaque showed lower prevalence per cent and parasitic load when compared to Bonnet macaques where chances of reinfection are higher due to overcrowding. Endoparastic infection will affect the health and wellbeing of animals in captive condition. Besides proper deworming and screening of parasitic diseases, the other strategies in proper housing that ensures hygiene also need to be explored to reduce the incidence of endoparasitic diseases.

Acknowledgements

The authors are grateful to Kerala Veterinary and Animal Sciences University for the facilities to conduct the study and to Dr. K. Syamala, Department of Veterinary Parasitology for the help rendered.

Conflict of interest

The authors declare that they have no conflict of interest.

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