Balantidium sp. Infection in Faeces Samples of Orangutan (Pongo pygmaeus) from Care Center and Tanjung Puting National Park Area, Central Borneo.

by Kehutanan turnitin

Submission date: 29-Jun-2024 11:14AM (UTC+0700)
Submission ID: 2410114984
File name: m-sp-Infection-in-Faeces-Samples-of-Orangutan-Pongo-pygmaeus.pdf (272.07K)
Word count: 3303
Character count: 17795

Balantidium sp infection in faeces samples of orangutan (pongo pygmaeus) from care center and Tanjung Putting...

Article · May 2012

CITATION
1

READS
74

3 authors:

Supriadi Supriadi
University of Mataram
11 PUBLICATIONS **5** CITATIONS
SEE PROFILE

Abdi Fithria
Universitas Lambung Mangkurat
3 PUBLICATIONS **1** CITATION
SEE PROFILE

Wisnu Nurcahyo
Gadjah Mada University
64 PUBLICATIONS **75** CITATIONS
SEE PROFILE

BIOLOGY, MEDICINE, & NATURAL PRODUCT CHEMISTRY ISSN: 2089-6514
Volume 1, Number 1, 2012
Pages: 47-52

Balantidium sp. Infection in Faeces Samples of Orangutan (*Pongo pygmaeus*) from Care Center and Tanjung Puting National Park Area, Central Borneo.

SUPRIADI[A], W. A. FITRIA[B], R. W. NURCAHYO[C]

[A]*Faculty of Veterinary Medicine, University of West Nusa Tenggara, Mataram*
[B*]*Faculty of Forestry, Lambung Mangkurat University, Borneo*
[C]*Department of Parasitology , Faculty of Veterinary Medicine, Gadjah Mada University, Yogyakarta*

ABSTRACT

Balantidium infection has been discovered in many animals including orangutans. The aim of this research is to identify the infection frequency of *Balantidium* sp. in Bornean orangutans in *Care Center* and Tanjung Puting National Park. A total of 239 samples have been collected from both areas in 2010. Laboratory analyses have been carried out utilizing a formalin-ethyl-acetate precipitation method to detect the presence of *Balantidium* sp. As results, *Balantidium* sp. was discovered in 24 (12.57%) samples from 191 samples in *Care Center* area and in 8 samples (16.67%) from 48 samples in Tanjung Puting National Park. *Balantidium* sp. infection generally occurs when the quality of orangutans' habitats decrease. The infection of *Balantidium* sp. in both areas has indicated that the ecosystem of orangutans has deteriorated. Further research is required to identify the sources and the patterns of infection in orangutans' group (age and sex) and individual. What is more, molecular characterization is necessary to identify the species of Balantidium due to its species diversity.

Key words: *Balantidium* sp., *Pongo pygmaeus*, faeces, Borneo.

INTRODUCTION

Orangutans are some of endemic primates discovered only in Indonesia, especially in Sumatera and Borneo island. However, the conditions of Sumateran orangutans (*Pongo abelii*) dan Bornean orangutans (*Pongo pygmaeus*) have deteriorated which put them into a great concern. In 1999, it was estimated that the population of Sumateran orangutans consists of 12,770 individual, while there were 23,133 individual in Bornean orangutans population (Rijksen and Meijaard, 1999). Due to the increase in orangutans hunting and orangutan babies' sales, their status has become endangered species. This fact has become more severe because of deforestations, fire, and illegal logging, as well as various infectious diseases in orangutans.

Many conservation efforts have been made to protect orangutans from extinction. One of the recently developed methods is a reintroduction method. Projects of orangutans' reintroduction have been conducted in Central Borneo as cooperation involving the Department of Forestry and Tropenbos Foundation. Reintroduction activity is directly controlled by research center for forestry (Wanariset). The reintroduction activity in Borneo refers to the method established by Dr. Herman Rijksen (Rijksen, 1978). This includes the quarantine process of orangutans after they are obtained or confiscated from community. This is important to carry out as an effort to restore the wild nature and the independence of the orangutans which have experienced changes in behavior or life patterns.

Some of important parts of the orangutans' quarantine process are examination and identification of various diseases that the orangutans might carry. These are required to detect whether there is any viral, bacterial or parasitic zoonoses. For parasitic diseases, some research has discovered that there are infectious parasitic zoonoses involving parasites such as nematodes, cestodes, and protozoa like amoebas and ciliates (Warren, 2001).

One example of protozoan zoonoses that have been reported infecting several non-human primates is *Balantidium spp* infection (Nille and Rivera, 2010). This kind of protozoa belongs to commensal ciliates group in several amphibians, insects, rodents, horses, camels (Headley *et al*., 2008), some mammals such as pigs (*Balantidium suis*), guinea pigs (*B. caviae*) and orangutans as well as humans (*B. coli*) (Schuster and Ramirez-Avila, 2008; Cho *et al*., 2006). Infection in orangutans has been reported by Warren (2001), who discovered Balantidium infection in Sumateran orangutans with 58% prevalence.

Balantidium coli is a well known opportunistic pathogen in non-human primates and humans (Nille and Rivera, 2010). This protozoan infection causes balantidiosis. Acute infection sometimes does not show clinical symptoms. However, chronic infection causes diarrhea, halitosis and severe stomachache due to tropozoid invasion in the intestine lumens. Infection in the carrier and reservoir hosts usually does not display clinical symptoms (Vazquez and Vidal *cited in* Schuster and Ramirez-Avila, 2008).

Balantidium infection in Bornean orangutan (*P.pygmaeus*) has been reported by Labes *et al*., (2010). The results show that the ratio of Balantidium prevalence between individuals and groups of Bornean orangutans is 40%:61%. Moreover, the risks of infection are getting higher in orangutans that are cared for in quarantine cages, because the probability of re-infection to other individuals is very high.

Nevertheless, the research was limited only to analysis of prevalence and intended to study various intestinal parasites, including nematodes. It was also limited only in few reintroduction areas of Nyaru Menteng and Wanariset of Central Borneo.

This research was conducted to identify *Balantidium* sp. infection in Care Center and Tanjung Puting National Park Central Borneo, which are different in locations and functions. The results are expected to provide representative data to recognize the epidemiology of Balantidium infection, especially in Central Borneo Province.

MATERIALS AND METHODS

Faeces samples of orangutans were collected from two different locations. The age and sex of the sampled orangutans were recorded based on actual observations in the fields and information from local community and professional staffs from Tanjung Puting National Park. The samples were collected in 2010-2011 from quarantined and wild orangutans, stored in absolute ethanol placed in 15 mL conical bottles then stored in cool box during the collecting activity in the fields. There were 48 samples collected from Tanjung Puting National Park and 191 samples collected from Care Center. Collected samples were then delivered to Laboratory of Parasitology Faculty of Veterinary Medicine Gadjah Mada University where they would be examined.

A formalin-ethyl-acetate precipitation method which referred to procedures developed by Foitova (2009) was utilized to examine the samples. The faeces samples as much as 1-2 grams were homogenized using aquadest, then centrifuged at 2500 rpm for 5 minutes. After the samples were clean from any impurity, 10% formalin was added up to the $^2/_3$ of the reaction tubes (7.5 mL). Next, the samples were centrifuged at the same speed and duration as the initial procedure. In the last step, 5 mL of ethyl-acetate were added to the precipitates, and then another centrifugation procedure was employed at 2500 rpm for 5 minutes, resulting in 4-layer precipitate formation. The cysts and tropozoids of Balantidium could be found in the bottom layer of the precipitates. Next, the samples were examined under medium magnification (10 x 10), and then after the cysts and tropozoids were visible, the magnification was increased to 10 x 40. Positive samples were documented utilizing an optilap microscope. The identification of cysts and tropozoid referred to Veterinary Parasitology by Tylor *et al*., (2007). Lastly, the entire data were then analysed descriptively based on field conditions and various information, including habitat, environmental and behavioural states, as well as other secondary data.

RESULTS

The first location of sample collections was Tanjung Puting National Park which is located near Pangkalan Bun City. This location is under the management of Tanjung Puting National Park Office in collaboration with International NGO *Orangutan Foundation Indonesia* (OFI), headed by Dr. Birrute Galdikas. The second location was orangutans Care Center which is a location for care and quarantine of orangutans after the orangutans were freed from their owners. This is also the place where the orangutans are rehabilitated and then reintroduced to the forests. The two locations were selected because they are the largest orangutan habitats in Borneo.

Tanjung Puting National Park has several types of ecosystems including lowland tropical rainforests, dry land forests, freshwater swamp forests, mangrove forests, coastal forests, and secondary forests. The Park area is dominated by lowland forest vegetations such as jelutung (*Dyera costulata*), ramin (*Gonystylus bancanus*), meranti (*Shorea* sp.), keruing (*Dipterocarpus* sp.), and rattans. There are also many rare endemic and protected species in Tanjung Puting National Park, including orangutans (*Pongo satyrus*), bekantan (*Nasalis larvatus*), maroon leaf monkeys (*Presbytis rubicunda rubida*), bears (*Helarctos malayanus euryspilus*), the java mouse-deer (*Tragulus javanicus klossi*), the clouded leopards (*Neofelis nebulosa*), and the leopard cats (*Prionailurus bengalensis borneoensis*). Tanjung Puting National Park is the first orangutans' rehabilitation place in Indonesia. Other three locations for orangutan rehabilitations are Harapan, Pondok Tanggui, and Camp Leakey. Bornean orangutans have dark reddish coat and no tails. As they grow up, adult males will develop cheek pads which will become larger as the orangutans get older. Tanjung Puting National Park has been defined as the Biosphere Reserve by UNESCO in 1997 and is a sister park of Malaysia's.

Table 1. Distribution of *Balantidium* sp. cysts found in faces samples of orangutans in Care Center area, Central Borneo.

No.	Sample Names	Cysts	No.	Sample Names	Cysts	No.	Sample Names	Cysts
1	Adam	++	65	Harry	-	129	Nicole	-
2	Ade	-	66	Harry 2	-	130	Omri	-
3	Alek	-	67	Hary	-	131	Orion	-
4	Andrew	-	68	Hayes	-	132	Paithon	-
5	Annenberg	-	69	Hiju/Hijau 1	-	133	Panti	-
6	Arapura	+	70	Hiju 2	-	134	Pascal	+
7	Ari 1	-	71	Hofmann	-	135	Patch	-
8	Ari 2	-	72	Huti	-	136	Patricia	+++
9	Bambang	-	73	Irvine	++	137	Penelope-C	-
10	Bangau	-	74	Ismi 2	-	138	Rangda	-
11	Beatrix	-	75	Ismi 1	-	139	Puji	-
12	Bela 1	-	76	Jack 2	-	140	Runzu	++
13	Bella	-	77	Jade	-	141	Rich	-
14	Benson	++	78	Jalin	++	142	Riesner	-
15	Berman	-	79	Jankis	-	143	Rimba 3	-
16	Best	-	80	Janice	++	144	Robret	-
17	Boncel	-	81	JAW 1	-	145	Roberta	-
18	Boy	-	82	Jaw	-	146	Roby	-
19	Bozes	-	83	Jay	-	147	Rocky	-
20	Brand	-	84	Jiko	-	148	Rodenty	++
21	Brant	-	85	Joe	-	149	Rodney	++
22	Britney	-	86	Joel	-	150	Rodney 2	-
23	Bungur	-	87	John	-	151	Roodney	-
24	Cari-B	-	88	Jonatan	-	152	Rosemerx	-
25	Carolin	-	89	Josemich	-	153	Rossy	-
26	Chelsea-2	++	90	Julian	-	154	Rowland	-
27	Chris	-	91	Julian 2	-	155	Rowland 2	-
28	Christina	-	92	Jumadi	-	156	Roy	-
29	Claire	-	93	Junkis	-	157	Saka Mentawa	+
30	Colin	-	94	Jusman	-	158	Samsu	-
31	Congo	-	95	Kawi	-	159	Savitri	-
32	Cooper	-	96	Kereng 2	-	160	Scotch	-
33	Craigh	-	97	Kereng	-	161	Seli	-
34	Daugi AS	-	98	Krisko	-	162	Sidney	+
35	Desy	++	99	Lanang	-	163	Suherty	-
36	Dewa	-	100	Lear	-	164	Sweet Suzane	-
37	Dominic	-	101	Lesly	++	165	Teddy	-
38	Donut	-	102	Levine	-	166	Thaeis	-
39	Dora	-	103	Lia	-	167	Thalas	-
40	Dr.Betelnut	-	104	Liana	-	168	Thales	-
41	Edwin	-	105	Lodik	-	169	TIM	-
42	Edwin 2	++	106	Lodik 2	-	170	Tio	-

No.	Sample Names	Cysts	No.	Sample Names	Cysts	No.	Sample Names	Cysts
43	Egol	-	107	Lumley	-	171	Tisunami	-
44	Eki	-	108	Malcom	-	172	Tobret	-
45	Elvis	++	109	Mamat	-	173	Tyson	-
46	Embri	-	110	Marsha	-	174	Uci	-
47	Emelly	++	111	MATT	-	175	Ujang	-
48	Erin	-	112	Maxin	-	176	Ulin	-
49	Faisal	-	113	Mercedes	-	177	Ulin 2	-
50	Fernando	-	114	Merdeka	-	178	Victor	-
51	Gabel	-	115	Michael	-	179	Violet	-
52	Gabriel	-	116	Mimi	-	180	Walixi	-
53	Gagak	-	117	Montana	-	181	Walman	-
54	GAIL	-	118	Morgan	-	182	Welkie	-
55	Galih	-	119	Morrison	-	183	Waliaty	++
56	Galih 2	-	120	Mozart	++	184	Wiliam	-
57	Gendut	-	121	MQ	-	185	Xena	-
58	Getty	-	122	MS Shaon	-	186	Yansu	-
59	Ginger	++	123	Murphy	-	187	Yanti	-
60	Glenda	-	124	Murray	-	188	Yogi	-
61	Goran	-	125	My Emily	-	189	Yohanes	-
62	Gugun	-	126	Myson	-	190	Yokyek	++
63	Harny	-	127	Natalia	-	191	Yotri	++
64	Zattara	-	128	Zeneca	-			

(-): no cysts/tropozoids; (+): 1-100 cyst per gram faeces samples; (++): 100-500 cysts/tropozoids per gram faeces samples.

The examination results of orangutan feces samples collected from the Care Center area show that from 191 samples, only 24 samples (Table 1) display positive infection of *Balantidium* sp. (12.57%). The entire positive samples show that the infection of *Balantidium* sp. in orangutans is in cysts stage.

Table 2. Distribution of *Balantidium* sp. cysts found in faces samples of orangutans in Tanjung Puting National Park area, Central Borneo.

No.	Sample Names	Cysts	No.	Sample Names	Cysts	No.	Sample Names	Cysts
1	FCU 1	++	17	FOU 3 TT	-	33	FOU TT 11	-
2	FCU 2	+	18	FOU 4 TT	+	34	FOU N3	-
3	FCU 3	++	19	FOU 6 TT	-	35	FOU AK 12	-
4	FCU 5	+	20	FOU 8 TT	-	36	FOU PS 1	-
5	FCU 7	++	21	FOU 9 TT	-	37	FOU PS 2	-
6	FCU 9	+	22	FOU AK 11	-	38	FOU Si 1	-
7	FOU 027	-	23	FOU AK 14	-	39	FOU Si 2	-
8	FOU 10 TT	-	24	FOU AK 3	-	40	FOU Si 3	-
9	FOU 12 F	-	25	FOU AK 4	-	41	FOU Si 5	-
10	FOU 14 F	-	26	FOU AK 8	-	42	FOU Si 7	-
11	FOU 16 F	-	27	FOU Ak 9	-	43	FOU Si 6	-
12	FOU 22 F	-	28	FOU AN	-	44	FOU T4T	-
13	FOU 23 F	-	29	FOU AN 3	+	45	FOU UN 1 TNTP	-
14	FOU 24 F	-	30	FOU F 18	-	46	FOU Un 2	-
15	FOU 25 F	-	31	FOU 20 F	-	47	FOU UR1	-
16	FOU 27 F	-	32	FOU 11	-	48	FOU F 21	-

(-): no cysts/tropozoids; (+): 1-100 cyst per gram faeces samples; (++): 100-500 cysts/tropozoids per gram faeces samples.

The distribution of cyst infection of *Balantidium* sp. in feces samples collected from Tanjung Puting National Park demonstrates relatively low frequency of infection. The data is almost similar to the results of feces sample examinations from the Care Center area. From 48 samples, only 8 samples (16.67%) show positive cyst infection of *Balantidium* sp. This examination results also show that there is Balantidium co-infection with *Strongyloides* sp. worms.

DISCUSSION

Level of *Balantidium* sp. infection in the two research locations is relatively low compared to that of other parasites' such as Strongyloides. Previous research discovered the high level of Strongyloides infection in Bornean orangutans live in Borneo Orangutan Survival (BOS) Foundation and Nyaru Menteng. There were 58% of Strongyloides infection in individual level and the other 37% was in group level (Labes *et al*., 2010). According to Foitova *et al*., (2008), co-infection of Balantidium with Strongyloides can be negative. If the Balantidium infection tends to be high, then the Strongyloides infection tends to be low, and vice versa.

The percentage of *Balantidium* sp. infection in Bornean orangutans kept in Care Center (12.57%) is lower than that in orangutans live in Tanjung Puting National Park (16.67%). These could be affected by differences in habitat types and environmental conditions in the orangutan rehabilitation location. The treatments and feeding of orangutans in Care Center may be more controlled than in the National Park. Most of the orangutans in Tanjung Puting National Park are semi-captives, unlike those in the Care Center. Almost all of the orangutans kept in the Care Center are rehabilitated or reintroduced and they are still in treatment stages before they are released back to their natural habitats.

High prevalence of *Balantidium* sp. in a certain location is a result of poor habitat (sanitation) (Schuster and Ramirez-Avila, 2008) and high contact with reservoirs (pigs) live around the habitats, either directly or indirectly (Mohammadi *et al*., 2004). The zoonoses of *Balantidium* sp. (Adejinmi and Ayinmode, 2008), either from animals to humans, humans-animals, or humans-humans have become serious threats. Although there has been no research which emphasizes specific Balantidium species that infects orangutans, the potential risks of infection to humans and orangutans need to be taken into account.

Naturally, orangutans possess arboreal characteristic and are very rare to be seen feeding on the ground. This characteristic is important to avoid infection from various parasitic agents like Balantidium and other parasite species (Labes *et al*., 2010). However, habitat degradation and a decrease in the number of feeding trees force the orangutans to search for food on the ground. As the soil is the transmission media of numerous protozoa, helminths, and bacteria, the risks of infection in and transmission of the parasitic agents to orangutans increase. These facts have become worse due to hunting, catches, domesticating of orangutans by the local community around the forests. Contact with humans also increases the numbers and species of parasites that might infect orangutans.

Not only that, the infection in an orangutan can also be a threat to other orangutans in one area. This is due to the ability of *Balantidium* sp. to move from one orangutan to others. Besides, natural habitats (forests) especially in Central Borneo have experienced degradation and drastic decreases in quality and quantity. Poor environmental quality will increase the transmission of parasites and can cause serious diseases (Nille & Rivera, 2010).

CONCLUSION

The results of this research can be utilized as comparative and complement data to previous study conducted by Labes *et al*., (2010), that Balantidium sp. infection can occur in almost entire habitats of orangutans. The results can also be developed into further research to identify Balantidium species until molecular level (DNA). This is to ensure the sources of infection and genetic relationships between Balantidium in orangutans and Balantidium in other animals as well as in humans. This is very important because it is difficult to differentiate Balantidium species microscopically.

Additionally, it is essential to carry out epidemiology and transmission model studies of Balantidium in orangutans. The studies would be beneficial to understand the habitat conditions and to support rehabilitation and conservation of orangutans in the future.

ACKNOWLEDGMENTS

We express our gratitude to the professional staffs at the Laboratory of Parasitology Faculty of Veterinary Medicine Gadjah Mada University. We also thank Mr. Tauhid who has provided his assistance in sample collection fieldwork. Everyone who cannot be all mentioned in this article is also acknowledged for their assistance during field studies and laboratory works.

REFERENCES

Foitova, I., Michael A.H., Nurcahyo W., and Milan O. 2008. *Parasite and Their Impacts on Orangutan Health*. Masaryk University.

Labes EM, Hegglin D, Girmm F, Nurcahyo W, Harrisson ME, Bastian ML, Deplazes P. 2010. Intestinal Parasites of endangered orangutan (Pongo pygmaeus) In Centeral and East Kalimantan, Borneo, Indonesia. **Parasitology**. Jan; 137 (1): 123-135.

Levine, N.D. 1961. Protozoan Parasites of Domestic Animals and Man. In Schuster and Ramirez-Avila (2008). Current World Status of Balantidium coli. **Clinical Microbiology Review**, Vol.21, No.4: 626-638.

Nille-Bije, Ma Laurdes and W. L. Rivera. 2010. Ultrastructure and Molecular Characterization of Balantidium coli isolated in the Philippines. **Parasitol Res** 106: 387-394.

Rijksen dan Meijaard, 1999. **Diambang Kepunahan!; Kondisi Orangutan Liar di Awal abad ke-21**. The Gobbon Foundation. Indonesia.

Rijksen, H.D. 1978. **A Field Study on Sumateran Orangutan *Pongo pygmaeus* and *Pongo abelii*** (Lesson, 1827): Ecology, Behaviour and Conservation. H. Veenam and Zone B. V. Wageningen.

Schuster and Ramirez-Avila. 2008. Current World Status of Balantidium coli. **Clinical Microbiology** Review, Vol.21, No.4: 626-638.

Mohammadi, S.S., M. Rezaian., H. Hooshyar., G. R. Mowlavi., Z. Babaei. and M. A. Anwar. 2004. Intestinal Protozoa in Wild Boars (Sus scrofa) in Western Iran. **Journal of Wildlife Diseases**, 40(4): 801–803

Balantidium sp. Infection in Faeces Samples of Orangutan (Pongo pygmaeus) from Care Center and Tanjung Puting National Park Area, Central Borneo.

ORIGINALITY REPORT

12%	12%	6%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.researchgate.net Internet Source	3%
2	pdfcoffee.com Internet Source	2%
3	dooeit.blogspot.com Internet Source	2%
4	e-journal.unair.ac.id Internet Source	2%
5	blog.topindonesiaholidays.com Internet Source	1%
6	etd.repository.ugm.ac.id Internet Source	1%
7	pure.itu.dk Internet Source	1%
8	www.indonesia-tourism.com Internet Source	1%

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		