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Parasites gastrointestinal on population rekrekan (Presbytis Fredericae) in forest slopes of Mount Slamet, Central Java, Indonesia

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Abstract

Research was conducted to identify the species of gastrointestinal helminthes of Javan Fuscous Monkey (*Presbytis fraederica*) which occupied in the rainforest of slope of mount Slamet. It is important step on the early detection of zoonotic disease and search the alternative prevention and recovery. The monkey which locally called as Rekrekan is concerned as endemic primate occupied in the Mount Slamet area. Based on the IUCN Red list database, this species is stated DD (Data Deficient). Of the samples collected from three different areas, we identified three nematode species including *Trichuris trichiura*, *Strongyloides* spp. and *Oesophagustomum* spp. The overall prevalence of helminthes was higher for *Trichuris trichiura* with the results are 77,7 and 63,6 at Kalipagu; 100 and 46,1 at Sidaboa; 25 and 45,4 at Taman Dringo. Whereas *Strongyloides* spp., the results are 27,2 and 27,2 at Kalipagu; 18,2 and 7,69 at Sidaboa; 8,3 and 9,09 at Taman Dringo. *Oesophagustomum* spp., the results are 33,3 and 18,1 at Kalipagu; 27,3 and 15,4 at Sidaboa; 8,3 and 9,0 at Taman Dringo.

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Introduction

One of the non-human primate species Rekrekan (local name) or also called Fuscous Javan Leaf Monkey (*Presbytis fraederica* Sodi, 1930) is an endemic primates in the rainforest of Slamet mountain side. Based on the IUCN Redlist record of this species has a status of DD (Data Deficient), which means that means there is enough information yet to be evaluated directly or indirectly on the risk of extinction based on its population status and distribution.

Taxon in this category can be better studied to appropriate data on abundance and distribution. So it would be better if any data available that can be used as a benchmark to assess its threatened status. One and the only research on the population of Rekrekanin Mount Slamet ever done is on the southern slope (36.6559 km²) in 2007 with an estimated population of 219 individuals with a density of 5.96 ind/km2 (Setiawan *et al.*, 2007). Forest fragmentation that occurred in Java and has lasted longer than the other islands became a threatened major factor.

Extensification of agriculture and housing in this period occurred more quickly lead to wildlife and endangered plants and urgency.

One of the wildlife that is currently threatened with extinction is the non-human primate (Supriatna, 2008).In addition to these conditions, the rate of population threatened Rekrekan in Slamet mountain slopes in the forest is because of some forest areas into its habitat have been opened for tourism purposes (wanawisata) (Afif, 2009). Thus increase the chance of interaction with humans.

Helminthiasis incidence of non-human primates in previous studies found no similarity with the parasite species that infect humans, so do not close the possibility of anthropozoonosis (Winaruddin *et al.*, 2001). By looking at the reality of the high chances of interaction between human populations with Rekrekan, necessary preliminary data related to the type of worm that infest Rekrekan in their natural habitat. It is very important as one parameter in estimating the level of Rekrekan threatened and human populations, especially the possibility of cross infection in helminthiasis. Also equally important is that parasitology in wildlife populations can provide insight about Rekrekan health evaluation and risk of infection, in turn, can be used as one of the pillars of conservation management as stated by Gillespie *et al.* (2005) and corroborated by Weyher *et al.* (2006). In an environment of wild animals, parasites can be an indicator of the ecology of wild primates (Vitazkova and Wade, 2007).

Hence, this study aims to conduct an inventory of species of parasites in the gastrointestinal helminthiasis of Rekrekan population in the southern slopes of Mount Slamet forest, as a first step the possibility of early detection of zoonotic diseases (diseases transmitted from humans to animals and vice versa) and alternative prevention and treatment.

Materials and methods

Study area

This research was conducted from January 23, 2008 to December 25, 2009, with research sites in the forest slopes of Mount Slamet, covers three areas namely Sidaboa (1000-1500 meters above sea level), Kalipagu (600-1000 meters above sea level) and dringo Park (1500 to 2500meters above sea level). Areas south slope of Mount Slamet is protected forests under the authority of the Unitary Pemangkuan Banyumas Forest East (East Banyumas KPH-Perhutanioffice Unit I Central Java). In general, the topography of the area of research is a typical tropical rain forest conditions in Java with the valley and a steep hill, with - average level of the slope steepness between 20 - 600. Rainfall in the area of Slamet mountain slopes - average 160 mm/year (BMG, 2009).

Research using blind sampling method in field sampling, it is because of factors Rekrekan behavior that always live in groups in the wild and the total volume of individual samples Rekrekan not sufficient

to do further laboratory tests. Stool samples can be taken based on the population by collecting a number of individual volumes in a population when individual samples had insufficient quantity and not representative for the laboratory test (Labes, 2009).

Sample Collection

The study took samples of feces from Rekrekan population encountered in every observation with the time of collection between the hours of 06.00 am until 18:00 pm. Stool samples from a population found Rekrekan collected and stored in a vial tube containing 70% ethanol with a volume of 20 ml. Then in each - each tube vial marked documentation that includes the date and time of collection, the serial number of the population and the coordinates of the location population. Samples - fecal sample in a tube vial is then immediately sent to the Laboratory of Parasitology, Faculty of Veterinary Medicine, University of Gadjah Mada (UGM) in Yogyakarta to do further tests. Shipping samples of feces carried out in 2 periods, the first period at the end of the dry season and period 2 at the end of the rainy season.

Laboratory observation of stool samples Rekrekan done with native methods and centrifuges. In the native method, feces are removed from the tube vials and taken as much as ± 2 g and then inserted into the cup of mortar. Furthermore, water is poured until the stool becomes watery while stirring for ± 5 minutes. Feces in the cup and then sucked up with pipette mortar and placed on glass objects, drops by as much as 0.3 ml of iodine solution made by mixing Lugol and pure water in the ratio 1: 5 (Ash and Orihel, 1991). Then observed under light microscope with10 to 40 times magnification. In the method of centrifuges, feces removed from the tube vials and taken as much as ± 2 g and then inserted into the test tube. Next add water to a height of 2/3 tube and stirred. Tube containing fecal samples put into centrifuges and played with a speed of 1500 rpm for 10 minutes (David and Munene, 2006). Then the volume of water that is above the supernatant discarded and the tube was poured into saturated sugar to a height of 2/3 tube and centrifuges for 5 minutes after stirring for 1 minute. Test tube and then left for 10 minutes then added saturated sugar solution until the surface becomes convex and left for 5 minutes. On the convex surface of the object attached to glass and then fluid attached to the underside of the glass object immediately covered with a cover glass and examined under a light microscope.

All findings in the form of stage larvae and worm eggs were measured and documented, then identified by using the method of consultation, the key determinant and literature. The results of this study were processed using the chisquare test statistics (likelihood ratio) to determine whether the prevalence of the parasite is a function of altitude cruising areas (home range) of a population Rekrekan.

Results

A total of 66 stool samples were used in this study - each sample represents a population Rekrekan. Genesis helmianthiasis on Rekrekan in their natural habitat has been detected mainly caused by the nematode group 3 species of *Trichuris trichiura*, *Strongyloides* spp and *Oesophagustomum* spp., As in Figure 1, 2, and 3 and listed in Table 1.

Table 1. The prevalence of helminthiasis in Rekrekan Slamet mountain slopes (%).

Parasites Species Nematoda	Kalipagu (500-1000 mdpl)		Sidaboa (1000-1500 mdpl)		Taman Dringo (>1500 mdpl)	
	Periode I	Periode II	Periode I	Periode II	Periode I	Periode II
Nematoda *Trichuris trichiura*	63,64	48,48	69,7	42,42	27,27	30,3
Strongyloides spp.	27,27	27,27	27,27	12,12	15,15	12,12
Oesophagustomum spp.	36,36	18,18	27,27	21,21	12,12	9,09

From as many as 3 species of nematode were detected through laboratory observation, there are trends *Trichuris trichiurais* a species with the highest prevalence in all three sampling areas, followed *Strongyloides* spp. and last *Oesophagustomum* spp. In general, the prevalence of *Trichuris trichiura* showed a high trend in the three areas of sampling, followed by successive-joined *Strongyloides* spp. and *Oesophagustomum* spp. On infection by *Trichuris trichiura* altitude factor region did not affect the prevalence.

Fig. 1. *Trichuris trichiura* eggs found in feces Rekrekan on the mountain slamet.

Based on the findings of research that shows that the prevalence of *Trichuris trichiura* ranked highest among *strongyloides Oesophagustomum* spp. and spp.it is proved that Rekrekan have a high level of vulnerability against *Trichuris trichiura.* Nematode species is a common class of attack on Non Human Primate (Ash and Orihel, 1990; Dewit *et al.*, 1991;

Levine, 1994; Munene *et al.*, 1998; Gotoh, 2000; Sajuthi *et al.*, 2001; Gillespie *et al.*, 2004; Hanh *et al.*, 2004; Legesse and Erko, 2004; Weyher *et al.*, 2007; Bezjian *et al.*, 2008). *Trichuris trichiura*or also called whip worm, can potentially zoonotic because this worm is located in the colon, cecum and appendix humans and primates with worldwide distribution, mainly tropical and sub-tropical (Ash and Orihel, 1990; Levine, 1994).

Health problems due to infection by *Trichuris trichiura* usually chronic asymptomatik, this is because the pathogenesis of *Trichuris trichiura* is by sucking blood from the host (Levine, 1994). Blood loss (blood loss) or by infection with *Trichuris trichiura*is 0.005 ml of blood per worm per day, 6-10x lower than *Necator americanus* and 30-50x lower than *Ancylostoma duodenale* (Layrisse *et al.*, 1967).Very likely Rekrekan infested by *Trichuris trichiura* by swallowing eggs that contain larval stage 1, because it is direct transmission of *Trichuris trichiura* (Flynn, 1973).

This conclusion was supported by the proximity factor Rekrekan population with the human population (some tourist area on the western slopes of Mount Slamet even get into the home range Rekrekan). In addition, because the behavior Rekrekan who always live in groups. *Strongyloides* spp. with prevalence in second place Rekrekan also known as thread worms. These worms can live in parasitic and free and can be zoonotic (Levine, 1994).Worm infected hosts by piercing the skin or swallowed. When has entered the skin, the worms enter the blood capillaries and carried into the bloodstream to the lungs and then they damage the capillary walls, into the respiratory tract and migrate to the trachea and down into the esophagus to the small intestine, where they then become larvae molting stage 4 and developing adults ((Flynn, 1973).

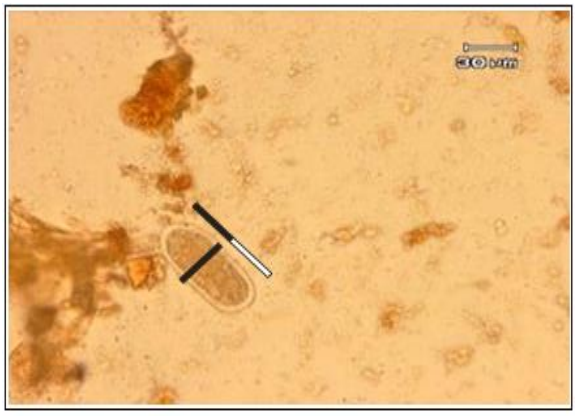

Fig. 2. *Oesophagustomum* spp. eggs found in feces Rekrekan on the mountain slamet.

The prevalence of Rekrekran's worms can continue to exist. This is due to infection by *strongyloides* spp. can take place through transplacental route and

transmammary (Pettifer, 1984; Muller-Graf *et al*., 1996). In addition to, the prevalence of Strongyloides spp. was also influenced by its proximity to human populations, it has been reported by Marisa Bezjian *et al.* (2008). *Oesophagustomum* spp. Rekrekan prevalence in third place is also known as hookworms. Based on previous research Myers and Kuntz (1965); Kuntz and Myers, (1966), Kuntz and Moore, (1973); Crockett and Dipeolu, (1984); Pettifer, (1984) reported that *Oesophagustomum* spp. is a common nematode that infects the class of old world monkeys (Old World Monkeys) and apes. nematode species are not zoonoses. Rekrekan likely to become infected by swallowing larvae 3 which will then directly into the colon and develop into adults and lay eggs (Flynn, 1973). In the lumen of the colon, *Oesophagustomum* spp. causes the formation of nodules- nodules on the mukosanya, so that this worm is also known as worm nodules (Marisa Bezjian *et al*., 2008). The prevalence of *Oesophagustomum* spp. on Rekrekan wild, very closely related to the prevalence of this worm is found in the cattle population was in the cage -cage close to the habitat and livestock Rekrekan released on the outskirts of the forest as reported by Ovianto D (2009).

Fig. 3. Eggs and larvae found *Strongyloides* spp in feces Rekrekan on the mountain slamet.

Factors altitude region did not affect the prevalence of *Trichuris trichiura* so the higher an area home range Rekrekan with low temperatures and dwindling air pressure does not significantly influence the prevalence of *Trichuris*. It is very likely caused by the morphology *Trichuris trichiura* eggs that equipped with a thick egg wall. Structure of cell wall thickness of *Trichuris* sp. able to make an egg survive in an extreme atmosphere (Gotoh, 2000). Newton President (1982) reported that eggs with thick walls on *Trichuris trichiura* embiro to protect the inside from the heat and cold conditions even up to the period of 5 years. In a study conducted by Wani *et al.* (2006) reported that the worm *Trichuris trichiura* eggs can be found until at an altitude of 5400 feet in the highlands of Kashmir India. According to Messrs (2007), an environment that has the structure of the muddy ground and wet climate is favorable conditions for the development of *Trichuris trichiura* because the density of *Trichuris trichiura* eggs equal weight of water, therefore when the worm eggs fall into the river will, together with mud and such circumstances would protect the eggs from the sun. The opposite occurs in infections by *Strongyloides* spp. and *Oesophagustomum* spp. Based on field data, the higher the area of home range, these worm prevalence of both species showed a decrease significantly.

This, very likely because in a certain altitude, temperature and humidity have not yet reached the optimum conditions for embryonic development and hatching eggs. According to Levine (1994) the optimum temperature for development of strongyle worms group is 25 and 26^{o}C.The development of eggs into larvae at this temperature is 15-20 hours. In the state of habitats under optimum temperature, the eggs and larvae will experience hipobiosis strongyle (Marquardand Petersen, 1997). In the area of home range close to human populations, the prevalence of worms strongyle (*Strongyloides* spp. and *Oesophagustomum* spp.) Is high influenced by environmental factors. It is by looking at the high prevalence of *Strongyloides spp*. and *Oesophagustomum* spp. on livestock populations around the habitat Rekrekan. Sandjaja (2007) argues

that an area can be contaminated with gastrointestinal nematodes when used continuously for herding cattle infected by gastrointestinal nematodes.

In general, the three species of nematode infestation on Rekrekan can continue to occur because of factors Rekrekan behavior in their natural habitat. Supriatna and Wahyono (2000) states that rekrekan do geophagy. Behavior geophagy this means that rekrekan deliberately take land for certain purposes. Krishnamani and Mahaney (2000) suggested the reason animals do geophagy, namely, absorbing toxic metabolic waste in the digestive tract, as antacids, as an antidiarrheal, anti endoparasit, the supply of certain minerals, and iron supply in large quantities. This geophagy behavior, in addition to functioning as anti endoparasit, also contains the risk that is involved swallowing pathogenic organisms, including eggs and larvae of worms, into the body. In other words, behavior geophagy make Rekrekan into the life cycle of *Trichuris* spp. and strongyle worms. However, in research rekrekan behavior on Mount Slamet, not found even once geophagy behavior.

In addition, grooming behavior in primates is an important behavior to reduce infestation of ectoparasite. Yet it also brings increased risk of primate to endoparasite infection, especially endoparasite with a direct life cycle (Gillespie, 2005). Grooming behavior was observed also in rekrekan as other primates. So that it can be stated that grooming behavior has brought rekrekan at risk of auto-infection of parasites.

Conclusion

Helminthiasis incidence of gastrointestinal tract in Rekrekan on the southern slope of Mount Slamet forest dominated by *Trichuris trichiura, Strongiloides* spp. *a*nd *Oesophagustomum* spp. Level height in the topographic regions affected habitat Rekrekan prevalence of gastrointestinal nematode.

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