

Risk factors of toxoplasmosis in goat and sheep that influence in human infection

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ABSTRACT: Toxoplasmosis is a zoonosis that is transmitted from animals to humans. The definitive landlady of toxoplasmosis is a cat. However, goats can be infected by this disease. One third of the world's humans are estimated to be infected with toxoplasmosis. The purpose of this study was to determine the factors that influence the incidence of toxoplasmosis in humans and animals. The research method is by serological testing of toxoplasmosis in humans using ELISA and serological testing of toxoplasmosis in goats and sheep using ToMAT. The results showed that the prevalence of toxoplasmosis in humans was 15.1% while in goats it was 61.1% and in sheep it was 58.9%. Risk factors that influence the incidence of toxoplasmosis are maintenance management factors such as feeding from grass that take it from fields, provision of drinking water collected, procedures for providing cages, and also cat litter available. While health management factors that become risk factors are separated of sick animals. Potential human transmission through knowledge, attitudes and practices of farmers related to the control of toxoplasmosis. The conclusion of this study is the need for socialization to farmers to improve knowledge, attitudes and practices of farmers related to maintenance management and health enforcement factors that are a risk of transmitting toxoplasmosis, enclosure sanitation and maintenance management.

Keywords: Toxoplasmosis; Human; Goat

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INTRODUCTION

Human toxoplasmosis infection accrues while human have an immunodeficiency syndrome such as patient with HIV AIDS infection. The mortality of HIV AIDS is caused by encephalitis with the causative's agent is *T gondii*. The group illness of HIV AID will increase when the patient has a positive result of serological test of toxoplasmosis (Tenter *et al.*, 2000).

Toxoplasmosis is zoonotic diseases with cat as a definitive host. Toxoplasmosis is a major issue for cat lover. Meanwhile a scientific paper showed that transmission of toxoplasmosis is caused by meat consumption from mammals. Mammals is an intermediate host of toxoplasmosis such as sheep and goat. The transmission of this disease from uncooked of meat become a strategic issue of veterinary public health (Aguirre *et al.*, 2019). Seroprevalence of toxoplasmosis for sheep and goat in multispecies livestock 2017 have a result seroprevalence research conducted in 2017 showed that in one multispecies farm it was found that the seroprevalence of toxoplasmosis in goats and sheep was 38.5%. This means that in a group of goats and sheep, there is goat and sheep that are positive for toxoplasmosis. This is what then the background that goats and sheep are one of the risk factors in the transmission of toxoplasmosis through consumption of food of animal origin (foodborne disease) (Ahmed *et al.*, 2014; Hanafiah *et al.*, 2010).

(Saridewi *et al.*, 2013) Research on the seroprevalence of toxoplasmosis has been widely conducted in Indonesia, however, the integration between seroprevalence and transmission risk factors is still limited. Toxoplasmosis seropositive research in several regions in Indonesia includes 61% goats in Kalimantan, 40% Etawa goats in Kulon Progo and 70% goats and sheep in Sleman Regency (Nurcahyo *et al.*, 2013). Research conducted by Siregar dan Yuswandi (2014), shows that the prevalence of toxoplasmosis in female sheep in RPH Ngampilan Yogyakarta reaches 72%. The

results of the toxoplasmosis seroprevalence in goats in Denpasar showed that 46% of the samples had been infected with toxoplasmosis. The difference in positive seroprevalence for toxoplasma varies as stated by Ratnaningrum *et al.* (2016), this depends on the type of animal and its area (Saridewi *et al.*, 2013).

On the basis of this research, it is necessary to conduct research to decide what factors have the potential in transmitting toxoplasmosis to humans with sources of infection from sheep and sheep. Information on risk factors is the basis for toxoplasmosis control programs and cuts the chain of transmission. The purpose of this study was to find risk factors for toxoplasmosis in goats and sheep.

The compressed information will then be used as a material for socialization to farmers to break the chain of infection through changes in knowledge, attitudes and practices. This research is an integrated research between human health and animal health. Where is the seroprevalence test of toxoplasmosis in humans who are at risk of contracting toxoplasmosis and then the seroprevalence test of toxoplasmosis is carried out in goats and sheep. This data is then complemented with the identification of potential risk factors for toxoplasmosis infection in sheep and sheep. The hope of this research is that breeders can practice good breeding methods, so they can avoid toxoplasmosis.

MATERIALS AND METHODS

The research was conducted with a cross sectional study method. Sampling was carried out in Batu City which consisted of 3 Districts namely Batu District, Bumiaji District and Junrejo District in 2019.

Sample Determination

The number of samples of goats and sheep is determined with a confidence level of 95%, precision of 5% and an incidence of 10%, then using the formula (Retmanasari, Widartono, Wijayanti and Artama, 2017) the total sample is 138 heads.

$$Sampel (n) = \frac{Z^2 \frac{1 - \alpha/2^2 p (1 - p)}{d^2}}$$

Samples were taken from 3 sub-districts by taking into account the total population per district using the chance proportional to size (PPS) method. From the PPS per district, it was obtained data that the samples taken in Batu District were 43 heads, 38 in Junrejo District and 55 in Bumiaji. The number of human samples is adjusted to the number of breeders whose samples are taken along with animal health workers who are potentially infected with toxoplasmosis. The total human samples taken were 15 breeders and 10 animal health workers.

Making and testing the questionnaire

Risk factor tools were obtained from closed questionnaire data. Before the questionnaire was used, the validity and reliability were tested. The validity test based on the correlation was carried out with the Pearson Product Moment correlation. While the reliability test uses a single trial administration model with the Split-Half Method (split method method).

Toxoplasmosis serological test

Toxoplasmosis Testing with To-MAT at the Lampung Veterinary Center. The To-MAT test was conducted to decide IgG and IgM from goat and sheep serum. Meanwhile, testing for toxoplasmosis in humans was carried out at Syaiful Anwar Malang Hospital using the ELISA method.

Risk Factor Analysis

Risk factor analysis was carried out descriptively by comparing data on cases with exposure and cases without exposure. The descriptive data is then cross tabulated with the Microsoft Office Excel 2016 Pivot Table.

RESULT AND DISCUSSION

The results showed that the prevalence of toxoplasmosis in humans in Batu City was 15.1%, while the prevalence of toxoplasmosis in sheep was 58.9%, and in goats 66.1%. The risk factors for toxoplasmosis in livestock are related to the consumption of food of animal origin. Consumption of undercooked meat can be infected with toxoplasmosis and is at great risk of transmitting toxoplasmosis from animals to humans.

Table 1. The prevalence of toxoplasmosis in humans and animals

Districts	Human IgM	IgM Goat Sheep / Sheep
Breeders in Batu	0	Sheep 73%
Breeders in Bumiaji	16,7%	Sheep 66% Goat 82,2%
Breeders in Junrejo	20,0%	Sheep 67% Goat 50%
Animal Health Officer	8,7%	
Total	15,1%	Goat 66,1% Sheep 54,54%

The prevalence of toxoplasmosis in humans is 15.1%. The highest prevalence is in the Junrejo District (20.0%). For animal health workers, the prevalence is 8.7%. Toxoplasmosis is an occupational disease, animal health workers who often interact in handling disease cases consist of veterinarians and veterinary paramedics. Toxoplasmosis has a great potential to occur in breeders and animal health workers because both are always exposed to livestock. The incidence of toxoplasmosis is high in older humans. The incidence of

toxoplasmosis also correlates with the consumption of meat from poultry. Toxoplasmosis seroprevalence also correlates with the socioeconomic status of humans and relates to place of residence (Dubey, 2010)

Toxoplasmosis infection in sheep does not show pathognomonic symptoms. In 5 periods (2003-2008) it was reported that toxoplasmosis was found in goat and sheep in 24 provinces in Indonesia with an average prevalence of 42.9% (Iskandar, 2003). The results of the above study show that the

prevalence of toxoplasmosis in Batu City is higher than the average toxoplasmosis that occurs in provinces in Indonesia. This condition could be related to the cat population as the definitive host. Another definitive role is the rat, the chicken which allows roaming around the farm. For feeding, 50% of breeders do not give water to their sheep. The water provided comes from PDAM (22.2%), wells (22.2%) and the rest comes from, among others, rivers. Water given to livestock does not go through the cooking process (Brandong-Mong et al., 2015).

Feeding fresh grass should be on the sidewalk or not too close to the ground. As concentrate is administered, the concentrate should always be closed to avoid contamination of oocytes originating from cats, which can send toxoplasmosis horizontally (Iskandar, 2003). Overall, the samples were intensively housed. Based on Khadjadatun in Iskandar (2003), the extensive maintenance system allows the occurrence of toxoplasmosis greater than the intensive maintenance system.

Research conducted by (Retmanasari et al., 2017) states that demographic factors also affect the incidence of toxoplasmosis. Areas in the highlands have a lower risk of being infected with toxoplasmosis than those in the lowlands. Individual factors also influence the incidence of toxoplasmosis. In a study conducted by (Awad and Barakat, 2019) that in cats the factors that influence toxoplasmosis are gender, cat breed and age differences. So, in further research it is necessary to find each factor in sheep that have an impact on the incidence of toxoplasmosis (Lindsay and Weiss, 2004).

The prevalence of toxoplasmosis in humans in this study was 15.1%. The prevalence of toxoplasmosis in humans is very dependent on geography and microclimate such as humidity, altitude and temperature of a particular area. However, the lower prevalence is associated with the presence or absence of cats roaming around the farm and the habit of consuming lamb (Hernandez-Cortazar et al., 2015). The

approach to control toxoplasmosis is through an interdisciplinary collaborative approach between sectors known as One Health. Where the animal health sector must collaborate with the health and environment sector. Toxoplasmosis which is an intracellular zoonosis is an infectious disease found throughout the world with a heteroxenous life cycle. So that it will directly affect the environmental balance. Epidemiologically, breeders and animal health workers have the potential to be infected with *Toxoplasma*. Prevention efforts can be carried out by campaigning for the emergence of awareness of multi-disciplinary collaboration and integrated research as well as capacity building between sectors (Aguirre et al., 2019).

CONCLUSIONS

The conclusion of this study was the prevalence of toxoplasmosis in sheep in Batu City was 58.9%, while the prevalence of toxoplasmosis in humans was 58.9%. Toxoplasmosis in animals and humans in Batu City is classified as lower than toxoplasmosis in lowland areas. Farmers and animal health workers are at risk for infection with toxoplasmosis.

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