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AN EXPECTATION OF BIORESOURCE FUNCTION AGAINST PARASITE INFECTION ON ANIMAL HEALTH

Laurentius RUMOKOY[1, 2], Jimmy POSANGI[3], Wisje Lusia TOAR[2], Julio LOPEZ ABAN[4]

[1]Entomology Study Program, Postgraduate Programs, Sam Ratulangi University. Jalan Kampus Unsrat, Manado 95115, Indonesia
[2]Faculty of Animal Husbandry, Sam Ratulangi University. Jalan Kampus Unsrat, Manado 95115, Indonesia
[3]Faculty of Medicine, Sam Ratulangi University. Jalan Kampus Unsrat, Manado 95115, Indonesia
[4]Area of Parasitology, Faculty of Pharmacy, University of Salamanca, Avda Ldo Mendez Nieto, 37007. Salamanca, Spain

Corresponding author email: rumokoy@msn.com

Abstract

The studies of the utilization of bio-resources substance has an increasing to be applied in preventing parasitic infections in livestock related both to endo-parasite and ecto-parasite. The use of bio-resource could be extracted from a substance originated plants and animals. The immunoglobulins in colostrum are well known as important bio-resource for young neonate individual to protect against parasites even to the pathogenic microbes. In other part plants have a lot of bio-actives compound that are useful to conserve the animal health. This article is to present our study by using colostrum immunoglobulins and curcuma on endo-parasite infection treated in young experimental animals. The study was conducted by using seven-teen mice with four treatments (T). T1 signified an infection with parasite only, T2 represented a treatment of curcuma in animal infected with parasite, T3 was the treatment of colostrum immunoglobulin in animal infected with the parasite larva, and T4 showed a treatment of curcuma mixed with colostrum immunoglobulin in infected mice. The distribution of the colostrum Ig and curcuma substances was realized through a drinking water, given ad libitum. The data collection of larva in gut was realized at 7^{th} days post infection while the EPG data collection was taken at 5^{th} to 7^{th} days post infection. The results revealed that there has a significant response between the treatment ($P<0.01$) which a combination between colostrum immunoglobulin (T4) caused a highest number of larva observed, while There has a non-significant difference of EPG number ($P>0.05$) between all treatment (T1, T2, T3 and T4). We concluded that curcuma and colostrum immunoglobulin were useful to suppress the parasite of Strongyloides venezuelensis in the gut rather than to suppress the number of EPG in the fecal matter of experiment mice.

Key words*: parasites, livestock, curcuma, colostrums.*

INTRODUCTION

Animal and human health can be affected seriously by parasite infection. Parasites that found in the skin are categorized as ecto-parasites while the parasites that take place in digestive tract were called endo-parasites. Some arthropods are well known their infestation in animals and human skin, otherwise some helminths preferred live inside in the host body.

The use of bio-resources to overcome the parasite threat has been reported by Jolles et al. (2015), Toar et al. (2013) and Rumokoy et al. (2017[a]). Morais et al. (2013) used curcumin to evaluate its effect on the parasite *Schistosoma mansoni* infection in mice. Sanatombi and Sanatombi (2017) discussed about curcuma as nutritionally rich food products, which interest in medicinal properties and its bioactive compounds possessing wide bioactivities such as antioxidant, antiviral, antimicrobial, and anti-inflammation activities. Those authors mentioned six-teen edible curcuma included: *Curcuma zanthorrhiza*, *Curcuma aeruginosa, Curcuma amada, Curcuma longa, Curcuma angustifolia, Curcuma aromatic, Curcuma australasica, Curcuma caesia, Curcuma caulina.*

Rumokoy et al. (2017[b]) showed that thoraxial protein could be used to enhance young horse immunity. Colostrum has been used as an

important substance for new born animal's defense against pathogenic agents (Rasmussen et al., 2016; Rumokoy and Toar, 2014).

MATERIALS AND METHODS

The study of the role of bio-resource substance on the development of parasite was realized by using a level of curcuma extract 20 mg/L and a colostrum immunoglobulin 2g/L of drinking water distributed to mice infected with *Strongyloides venezuelensis.* This drink water was distributed *ad libitum.*

Several parameters were evaluated: eggs per gram, and the number of female larva in gut of experiment animals.

In this investigation we used 17 female mice housed in Centre of Animal Research, Salamanca University.

All experiment animals were maintained in this research centre. The colostrum IgG was obtained through the laboratory of Parasitology USAL. The larvae suspended at a concentration of 3 x 10^5/mL in PBS.

The animals were divided in four group according to the treatment (T). T1 was the control treatment, the animals were infected only with the parasite. T2 was the group of animals infected and received curcuma. T3 was the treatment of immunoglobulin substance applied to the infected animals. T4 was the treatment of the curcuma mixed with colostrum immunoglobulin. The data collection of larva numbers was made at 7th days post infection, and the EPG was observed at 5th, 6th and 7th days post infection (DPI).

The data of eggs number in fecal matter were statistically analyzed by ANOVA. The development of female adult in the gut, for each group, were performed by using the SPSS software.

RESULTS AND DISCUSSIONS

The Table 1 and the Figure 1 represented that there has a significant response between the treatment ($P<0.01$) which the treatment of a combination between colostrum immune-globulin (T4) caused a highest number of larva observed while the single treatment of colostrum immunoglobulin substance was able to decrease the number of parasite in the gut.

Tabel 1. Treatment response on parthenogecetic females in gut on day 7th post infection

Treatment group	# mouse	Number of parasite found
T1a_inf	1	30
T1b_inf	2	45
T1c_inf	3	30
T1d_inf	4	35
T1e_inf	5	15
T2a_cur+inf	1	30
T2b_cur+inf	2	35
T2c_cur+inf	3	90
T2d_cur+inf	4	20
T3a_ig+inf	1	15
T3b_ig+inf	2	5
T3c_ig+inf	3	5
T3d_ig+inf	4	5
T4a_cur+ig+inf	1	30
T4b_cur+ig+inf	2	15
T4c_cur+ig+inf	3	170
T4d_cur+ig+inf	4	60

Notes: T1a-e_inf represented the treatment of infection with parasite only, T2a-d_cur_inf represented to the treatment of curcuma in animal infected with parasite, T3a-d_ig_inf represented to the treatment of colostrum immunoglobulin in animal infected with the parasite larva, and T4a-d_cur_ig_inf showed a treatment of curcuma mixed with colostrum immunoglobulin in infected mice.

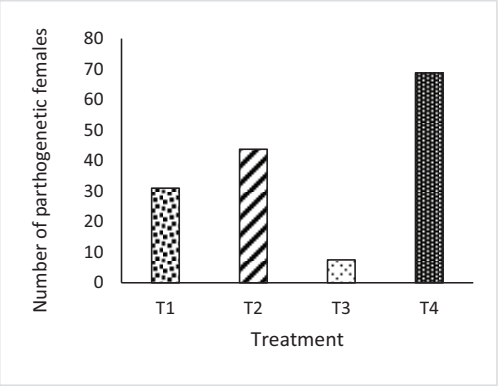

Figure 1. The comparison of each treatment respons on parasite number in the gut of experiment animals

The post hoc test by using the LSD analysis showed that the T3 and T4 has a significant different on parasite number in the gut. The response in T4 described that level curcuma (20 mg/L) mixed with colostrum immunoglobulin

in this experiment was not able to decrease the larva in gut compared to other treatment T2 and T3. This results showed that colostrum was more effective compared to the curcuma to overcome the parasite of *Strongyloides* in the gut. The positive effect of colostrum Ig as in treatment T3 on parasite infection in mice could be linked to the report of Rumokoy and Toar (2014) that colostrum IgG was important to protect the neonate from an infection with microbe or parasite *ex-utero* environment. According to Rasmussen et al. (2016) the neonates have a better chance to growth by receiving colostrum. Other possibility to overwhelm the problem of parasite infection is to empower the insect immunogenic substance as studied by Rumokoy et al. (2017[b]).

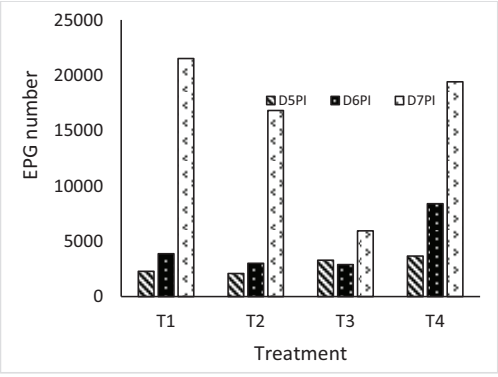

Figure 2. The treatments effect on EPG number. DPI corresponded to 'day post infection'

Figure 2 described a total of EPG of animal infected with parasite of *Strongyloides venezuelensis* after treating with curcuma and immunoglobulin colostrum to the animals. There has a non-significant difference of EPG number ($P>0.05$) between all treatment (T1, T2, T3 and T4). The highest number of EPG was in D7 post infection followed by D6 post infection. Otherwise in the T1 in the day 7thpost infection increased the EPG number compared to others treatment. The treatment T3 in all day of observation tended to reduce the number of EPG. Although the combination treatment between curcuma and colostrum immunoglobulin has no difference effect on parasite infection, but those substance has an expectation to be used in treating the other health problems as described by Maheshwari et al. (2006), Ruby et al. (1995). Gutiérrez-Gutiérrez et al. (2017) presented that curcumin disrupted the cytoskeletal structures of a protozoa (*Giardia lamblia*), it correlates with a reduction of tubulin expression and changes on its distribution. Furthermore, according to this authors that there are several drugs for treating giardiasis but they are often cause sides effect. Otherwise Morais et al., 2013, demonstrated that the *in vitro* incubation of *S. mansoni* with different doses of curcumin causes a reduction in viability of adult worms, a decrease in egg production and an increase in worm pairs separation.

CONCLUSIONS

Curcuma and colostrum immunoglobulin were useful to suppress the parthenogenetic female *Strongyloides venezuelensis* in the gut rather than to suppress the number of EPG in the fecal matter of experiment mice.

REFERENCES

Esam Almalki, Esam M. Al-Shaebi, Saleh Al-Quarishya, Mansour El-Matboulic, Abdel-Azeem, S.Abdel-Baki, 2017. *In vitro* effectiveness of *Curcuma longa* and *Zingiber officinale* extracts on *Echinococcus protoscoleces*. Saudi Journal of Biological Sciences, 24(1), 90-94.

Jolles A.E., Brianna R.B., Dolan B.P., 2015. Beyond mice and men: Environmental change, immunity and infections in wild ungulates. Parasite Immunol., 37(5), 255–266.

Maheshwari R.K., Singh A.K., Gaddipati J., Srimal R.C., 2006. Multiple biological activities of curcumin: a short review. Life Sciences, 78, 2081-2087.

Morais E.R., Oliveira K.C., Magalhães L.G., Moreira E.B.C., Verjovski-Almeida S., Rodrigues V. 2013. Effects of curcumin on the parasite *Schistosoma mansoni*: a transcriptomic approach. Mol. Biochem. Parasitol., 187, 91-97.

Rasmussen S.O., Martin L., Østergaard M.V., Rudloff S., Li Y., Roggenbuck M., Bering S.B., Sangild P.T., 2016. Bovine colostrum improves neonatal growth, digestive function, and gut immunity relative to donor human milk and infant formula in preterm pigs. Am. J. Physiol. Gastrointest Liver Physiol., 1, 311(3), G480-91. doi: 10.1152/ ajpgi.00139.2016. Epub 2016 Jul 21.

Ruby A.J., Kuttan G., Babu K.D., Rajasekharan K.N., Kuttan R., 1995. Anti-tumour and antioxidant activity of natural curcuminoids. Cancer Letters, 94, 79-83

Rumokoy L., Kaunang C., Toar W.L., 2017[a]. Efek ekstrak minyak citronella *Cymbopogon nardus* L. terhadap proporsi frekuensi kontak fisik *Musca domestica* L. (Diptera: Muscidae) padaransum dan performa broiler. Jurnal Entomologi Indonesia, 14(2), 89-96. DOI: 10.5994/jei.14.2.89.

Rumokoy L., Adiani S., Assa G.J.V., Toar W.L., Aban J.L., 2017[b]. Entomology contribution in animal immunity: Determination of the crude thoraxial glandular protein extract of *Stomoxys calcitrans* as an antibody production enhancer in young horses. Journal of Entomological and Acarological Research, 49 (3), 140-143. http://www.pagepressjournals.org/index.php/jear/article/view/7074/6924.

Rumokoy L.J.M., Toar W.L., 2014. The equine colostrums of milk treatment against pathogenic agent. Scientific Papers Series D. Animal Science, 52, 174-177.

Sanatombi R., Sanatombi K., 2017. Nutritional value, phytochemical composition, and biological activities of edible Curcuma species: A review. International Journal of Food Properties. 20(3). https://doi.org/10.1080/10942912.2017.1387556.

Toar W.L., Warouw J., Tulung M., Najoan M., Rumokoy L., 2013. The landing periodicity of *Stamoxys calcitrans* in ration, supplemented with citronella and papain on broiler health. Journal of Lucrări Ştiinţifice Seria Zootehnie, 59 (18). http://www.uaiasi.ro/zootehnie/Pdf/Pdf_Vol_59/Wisje_Lusia_Toar.pdf

Toar W.L., Kaunang C., Untu I.M., Rumokoy L., Kiroh H., 2017. The empowerment of crude extract antigen-G of insect on goats immunity enhancement. An entomology contribution in animal husbandry. Scientific Papers. Series D. Animal Science, Vol VX. http://animalsciencejournal.usamv.ro/pdf/2017/Art47.pdf