Concomitant Infection with *Leishmania donovani* and *Plasmodium berghei* Causes Pro-inflammatory Polarization Resulting in Malaria Exacerbation in BALB/c Mice

Rebeccah. M. Ayako[1,2,*], Joshua. M. Mutiso[1], John. C. Macharia[2], David Langoi[3], Lucy Ochola[2]

[1]Department of Zoological Sciences, Kenyatta University, Nairobi, Kenya
[2]Department of Tropical and Infectious Diseases, Institute of Primate Research, Nairobi, Kenya
[3]Department of Animal Sciences, Institute of Primate Research, Nairobi, Kenya

Abstract:

Malaria and visceral leishmaniasis coexist in the same geographical regions. However, dual co-infection with parasites causing these diseases and their impact on public health is poorly documented. Interactions between these parasites may play a role in disease outcome. The present study set out to evaluate the clinical and immunological parameters following *Leishmania donovani* and *Plasmodium berghei* co-infection in BALB/c mice. Mice were divided into four groups; *L. donovani*- only, *L. donovani-P. berghei*, *P. berghei*- only and naïve. Body weight, parasite burden, total IgG, IFN-γ and IL-4 responses were determined. To determine the survival rate, four mice were used from each group. Tissues for histological analysis were taken from spleen, liver and brain. Results indicated significant differences in body weight ($P<0.0001$), *L. donovani* parasite load ($P< 0.0001$), *L. donovani* IgG ($P< 0.0001$), *P. berghei* parasitemia ($P= 0.0222$), *P. berghei* IgG ($P= 0.002$), IFN-γ ($P<0.0001$) and IL-4 ($P<0.0001$) in dual-infected mice. There was no correlation between *L. donovani* parasite load and IgG responses in single or dual infections, while there was a positive relationship of *P. berghei* parasitemia and IgG responses in the dual infection group only. *Plasmodium berghei* had the highest mortality rate compared to *L. donovani*- only and *L. donovani- P. berghei* infected mice groups. Histological analyses showed enlarged red and white pulps and pathological changes in the spleen, liver and brain tissues which were less pronounced in co-infected group. We conclude that *L. donovani* and *P. berghei* co-infection reduces disease severity and these changes seem to correlate with variation in serum IgG and cytokines (IFN-γ and IL-4). Therefore, the study recommends the importance of inclusion of early screening of malaria in Visceral Leishmaniasis patients in regions where malaria is co- endemic.

Biography of presenting author

Rebeccah M. Ayako is a postgraduate fellow at the Institute of Primate Research, Kenya. She has been involved in COVID 19 immunoprofiling, Optimization of IgG and IgM Detection Kit for COVID 19, role of Interleukin 4 (IL-4) and Macrophages in *S. mansoni* infection in *Papio Anubis,* immunological implications of concordant visceral leishmaniasis and malaria infections, *Leishmania*- SHIV co- infection. She has received a grant on assessing nationwide seroprevalence survey of COVID 19. Ms. Ayako is a member of Kenya Society of Immunology and is also one of the members of the Global Health Implementation Group for COVID innovation.

Details of presenting author:

Name: Rebeccah Moraa Ayako
Affiliation: Institute of Primate Research
Country: Kenya

Other Details:

Presentation Category: (Poster Presentation)
Session Name: Infectious Diseases, Prevention, Control and Cure
Email: ayakorebeccah@gmail.com
Alternative email: rebeccahayako20@gmail.com
Contact Number: +254723580309
Twitter/Facebook/LinkedIn: www.linkedin.com/in/rebeccah-ayakoa70742145

Recent Photograph: (High Resolution)