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POORLY-MANAGED ECOTOURISM: RISK FACTOR FOR TRANSMISSION OF MDR BACTERIA FROM NON-HUMAN PRIMATES?

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Nature-based tourism has become the fastest growing economic sector in Malaysia. Many ecotourism sites allow for close human-animal interaction (HAI), lacking educated supervision and awareness of potential health risks. Non-human primates (NHPs) are of particular interest in this HAI having served as reservoir for more than 70 zoonotic diseases to humans. Ecotourism sites encourage direct contact with the NHPs, which increases the risk of cross-species transmission of infections. It has been recently discovered that methicillin resistant Staphylococcus aureus (MRSA), once thought to be clinically-originated, is community-acquired from non-clinical settings. This may apply not only to MRSA but also to other antimicrobial resistant (AMR) bacteria such as Enterococcus sp and Escherichia coli. This study was carried out to investigate if the NHP-human interaction poses a risk in transmitting zoonotic pathogens based on microbiological data and to establish if a relationship exists between AMR carriage and host gut microbiome (MDR) bacteria in faecal samples of NHPs (Macaca fascicularis and Trachypithecus cristatus) and humans (Homo sapiens, HS). Methicillin-Resistant S. aureus (MRSA) and Vancomycin-Resistant Enterococcus (VRE) were isolated in different agar mediums and characterized by antimicrobial susceptibility using the disk diffusion method. The most resistant and least resistant faecal samples were sent for 16S rRNA sequencing to identify microbiota that might underpin antibiotic resistance. Principle Component Analysis (PCA) was used to group samples based on antibiotic profile, resistant bacteria and host species microbiome. From our study, humans were found to harbor higher levels of AMR suggesting a higher possibility of arthropozoonosis. Higher load of AMR was correlated to a less diverse gut microbiome and vice versa. Despite the initial focus of ecotourism intended for conservation, AMR spread can be minimised if proper regulatory guidelines are set via awareness programmes to staff, tourists and locals in addition to incorporation of these information into brochures and marketing materials.

Recent Publications

1. Yang S K, Yusoff K, Mai C W, Lim W M, Yap W S, et al. (2017) Additivity vs. synergism: Investigation of the additive interaction of cinnamon bark oil and meropenem in combinatory therapy. Molecules 22:1733.
2. Song A A L, In L L A, Lim S H E and Raha A R (2017) *Lactococcus lactis:* From food to factory. Microbial Cell Factories 16:55.
3. Mehrabadi M H F, Bahonar A, Mirzei K, Molouki A, Ghalyanchilangeroudi A, et al. (2017) Prevalence of avian influenza (H9N2) in commercial quail, partridge, and turkey farms in Iran, 2014–2015. Tropical Animal Health and Production 213:10–17.

4. Tye K Y, Lim S H E, Gan S Y, Tan S E, Chen C A, et al. (2016) Comparison of visual observation and emission intensity of resazurin for antimicrobial properties of hexane, dichloromethane, methanol and water extracts from a brown alga, *Turbinaria ornata*. Cogent Biology 2:1225877.
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Biography

Swee Hua Erin Lim has completed her PhD in Medical Biotechnology from the Universiti Putra Malaysia. She is an Assistant Professor at the Health Sciences Division, Abu Dhabi Women's College, Higher Colleges of Technology, in addition to being an Adjunct Associate Professor at the Perdana University-Royal College of Surgeons in Ireland and Perdana University-School of Data Sciences. She has published a book chapter, more than 15 papers in reputed journals and presented in many international conferences. She has also been serving as a Reviewer of reputable ISI indexed journals.

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