Pathogenic fungi of Rhodotorula dairenensis is linked with colorectal cancer patients in Malaysia

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ABSTRACT

Background: Colorectal cancer (CRC) is the second most lethal disease with about 1.9 million new cases and 0.9 million fatalities worldwide in 2020. It is expected that the CRC prevalence to rise steadily each year. Several studies have linked the gut microbiome to CRC, particularly emphasizing the prokaryotic communities’ functions. However, it is unclear how other gut microbiota components, such as fungal communities, could be related to the pathogenesis of CRC. Hence, we aimed to explore the role of opportunistic fungal pathogens and the host’s phenotypes among CRC patients.

Methods: Biopsy samples were obtained during colonoscopy sessions from 64 individuals. Of which, 32 are colorectal cancer patients comprising the early-onset CRC, and late-onset CRC groups, 22 are diagnosed with polyps during colonoscopy and the remaining are rectal swabs from normal individuals without any previous disease history. Informed consents were obtained from all patients before collecting their biopsy samples. The gDNA were extracted using Ultra Deep Microbiome Prep Kit. Prior to sequencing, the amplicons of microbial genome libraries were by targeting the ITS1 regions. Finally, the microbial genomic data were analysed using state-of-art bioinformatic tools.

Results: A total of 6,477,706 read counts were generated, representing 1,364 amplicon sequence variants of fungi. At phyla, Ascomycota, Basidiomycota, Mortierellomycota, and Chytridiomycota were mainly found in both early and late-onset CRC patients. Moreover, the alpha-diversity showed significant differences between early and late-onset CRC patients, polyps, and normal individuals; Chao1 diversity (p-value = 0.0017509). Based on Linear discriminant analysis Effect Size analysis, the species Rhodotorula dairenensis was found to have a positive correlation for both early and late-onset colorectal cancer patients.

Conclusions: Our findings imply the correlation between the presence of opportunistic fungal species Rhodotorula among CRC patients in Malaysia. Previous studies reported that cancer patients are at higher risk
for *Rhodotorula* infection. However, further study is needed in order to elucidate the role of the opportunistic pathogen during disease progression.

**KEYWORDS:**

Colorectal cancer; CRC; Malaysia; *Rhodotorula dairenensis*