

Antifungal Activities of *Camellia Sinensis* Crude Extract on Selected Pathogenic and Mycotoxic Fungi

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Abstract:

Human fungal infections pose serious medical issues. Up to now, more than a hundred thousand fungal species are considered as natural contaminants. During the last decade, the incidence of superficial and deep mycotic infections has continued to increase explosively. There is a general consensus among researchers, clinicians and pharmaceutical companies that new, potent, effective and safe antifungal drugs are needed. Majority of work has been conducted on *Camellia sinensis* extracts against bacterial agent's activity but little work for antifungal activity. In this study, *in vitro* antifungal activities of *Camellia sinensis* crude extracts compared with azole group of compounds on selected pathogenic and mycotoxic fungi were determined. That was done by evaluating the difference in antifungal activities of green and black tea crude extracts having a concentration of 100mg mL⁻¹. Quantitative bioassay was done using disc diffusion method and Minimum Inhibition Concentration was done using broth dilution methods. The fungal isolates used for bioactivity testing were yeasts; *Candida famata*, *C. lusitaniae*, *C. tropicalis* ATCC 750, *C. parapsilosis* ATCC 22019, *C. glabrata* ATCC 24433, *C. krusei* ATCC 6258 and *Cryptococcus neoformans* ATCC 66031; and moulds, *Trichophyton mentagrophytes*, *Microsporum gypseum*, *Fusarium monilliforme*, *Aspergillus* spp and *Penicillium chrysogenum*. ATCC standard fungal strains and clinical isolates were included. Green tea crude extract showed stronger inhibitory effect against the fungal strains tested than black tea crude extract. There was a significant difference in zone of inhibitions ($T=4.09$, $P<0.05$). Zone of inhibition exhibited by green tea crude extracts ($11.92\pm 0.00\text{mm}$) were higher than black tea crude extracts ($8.14\pm 0.56\text{mm}$). The pattern of activity by tea crude extracts against ATCC standard fungal strains and clinical isolates strains were similar. *C. famata*, *C. lusitaniae*, *C. tropicalis* ATCC 750 and dermatophyte, *T. mentagrophyte* were inhibited by green tea crude extract ($\text{IZD}\geq 15\text{mm}$). Clinical isolates of *Candida albicans* (strain 4 and strain 5); *Cryptococcus neoformans* (strain 3, 5 and 12), showed susceptibility to *Camellia sinensis* green crude extracts. The MIC of *Camellia sinensis* crude extracts against fungal isolates tested ranged from 50 mg mL⁻¹ to 1.6 mg mL⁻¹. Hot green tea crude extract (mean MIC 12.25mg mL⁻¹) had a higher MIC on clinical fungal isolates than cold green tea crude extract (Mean MIC 12.167 mg mL⁻¹). The concentrates of aqueous *Camellia sinensis* crude extracts showed synergistic activity with conventional antifungal drug. However, level of synergism differed as observed in difference in inhibitory effect. The difference in inhibitory effect was significant ($P<0.05$). The crude tea extract restored the activity of lower concentration of antifungal, Fluconazole below MIC to susceptible breakpoints. Generally, the MFC (Minimum Fungicidal Concentration) of Mixture crude extracts were slightly higher as compared to that of green tea crude extract. These results are suggestive that addition of milk to blend the crude extracts altered the bioactive ingredients resulting to higher concentration for its MFC as compared to crude extracts alone. The studies on *Camellia sinensis* crude extracts (green

and black) have shown remarkable antifungal activity against different strains of fungi and highlighted its significance to humans as potential health products.