The Rising Challenge of Parasite Drug Resistance: A Global Health Perspective.

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Introduction

Parasitic diseases continue to impose a substantial burden on global health, particularly in tropical and subtropical regions. Diseases such as malaria, leishmaniasis, schistosomiasis, and filariasis affect hundreds of millions of people annually, causing significant morbidity and mortality. While pharmacological interventions have long been the cornerstone of parasitic disease control, the emergence and spread of drug-resistant parasites are threatening these gains. Parasite drug resistance is not merely a clinical concern—it is a public health emergency that requires urgent and coordinated action [1, 2, 3, 4].

Understanding Parasite Drug Resistance

Drug resistance in parasites occurs when a parasite evolves to survive exposure to a drug that would normally kill it or inhibit its growth [5, 6, 7]. This resistance is often driven by genetic mutations, selective pressure from widespread and sometimes inappropriate drug use, and transmission dynamics that allow resistant strains to proliferate.

In protozoan parasites such as *Plasmodium falciparum*, resistance to antimalarial drugs like chloroquine, sulfadoxine-pyrimethamine, and even artemisinin has been documented. Similarly, in helminths, resistance to anthelmintics like albendazole and ivermectin is increasingly reported, especially in veterinary contexts but with growing concern for human populations.

Mechanisms and Spread

The mechanisms of resistance vary widely. In malaria, mutations in specific genes such as *pfcrt* and *kelch13* are associated with resistance. In helminths, β-tubulin gene mutations have been linked to benzimidazole resistance. The spread of resistance is exacerbated by several factors:

Overuse and misuse of antiphrastic drugs.

Lack of diagnostic tools, leading to presumptive treatment.

Inadequate health infrastructure in endemic regions.

Incomplete treatment regimens due to poor access or patient non-adherence.

Implications for Public Health

The rise of drug-resistant parasites has profound implications. Treatment failures can lead to prolonged illness, increased transmission, and higher mortality. Drug resistance also drives up healthcare costs due to the need for more expensive second-line treatments and extended hospital stays. Moreover, it jeopardizes global efforts to control or eliminate parasitic diseases, as seen in the stalling progress against malaria in some regions [8, 9, 10].

Conclusion

Parasite drug resistance is an evolving challenge that threatens decades of progress in controlling parasitic diseases. It calls for an urgent reassessment of current treatment strategies and investment in sustainable public health interventions. As we navigate this era of resistance, innovation, surveillance, and collaboration will be key to safeguarding human health against these persistent threats.

References

1. Bornette G, Puijalon S. Response of aquatic plants to abiotic factors: a review. Aquat Sci. 2011;73(1):1-4.
2. Desmonts G, Couvreur J. Congenital toxoplasmosis: a prospective study of 378 pregnancies. N. Engl. J. Med. 1974;290(20):1110-6.
3. Freeman K, Salt A, Prusa A, et al. Association between congenital toxoplasmosis and parent-reported developmental outcomes, concerns, and impairments, in 3 year old children. BMC pediatrics. 2005;5(1):1-0.
4. Galal L, Hamidovic A, Darde ML, et al. Diversity of Toxoplasma gondii strains at the global level and its determinants. Food and Waterborne Parasitology. 2019; 15:e00052.
5. Gilbert RE, Peckham CS. Congenital toxoplasmosis in the United Kingdom: to screen or not to screen?. J Med Screen. 2002;9(3):135-41.
6. Pal DK, Nimse SB. Little known uses of common aquatic plant, Hydrilla verticillata (Linn. f.) Royle.
7. Raja S, Ramya I. A comprehensive review on Polygonum glabrum. Int J Phytomedic. 2017;8(4):457-67.
8. Singh A, Mishra A, Chaudhary R, et al. Role of herbal plants in prevention and treatment of parasitic diseases. J Sci Res. 2020;64:50-8.

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9. Valentini P, Annunziata ML, Angelone DF, et al. Role of spiramycin/cotrimoxazole association in the mother-to-child transmission of toxoplasmosis infection in pregnancy. Eur J Clin Microbiol Infect Dis. 2009;28(3):297-300.

10. Vara Prasad MN, de Oliveira Freitas HM. Metal hyperaccumulation in plants: biodiversity prospecting for phytoremediation technology. Electron J Biotechnol. 2003;6(3):285-321.