

A comprehensive analysis of viability assessment methods for *Giardia lamblia* and *Trichomonas vaginalis*: a systematic review

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Background: *Giardia lamblia* (*G. lamblia*) and *Trichomonas vaginalis* (*T. vaginalis*) are flagellated protozoan parasites responsible for giardiasis and trichomoniasis, respectively. These infections, often asymptomatic, can manifest with gastrointestinal and genitourinary symptoms [1,2]. Metronidazole serves as the primary pharmacological treatment for both diseases, but it has limitations, including adverse effects and the emergence of drug-resistant strains [1,3]. *In vitro* models are essential for the development of novel treatment options [4]. However, the diversity of viability assessment methods has led to inconsistent results and challenges in comparing studies. **Aim:** This study provides a comprehensive overview of commonly employed methods for assessing the viability of trophozoites of these parasites in the presence of compounds with therapeutic potential. **Methods:** In September 2023, a literature search was conducted on PubMed, ScienceDirect, and Web of Science using predefined search terms, including "in vitro", "method", "susceptibility", "viability", "sensitivity", "giardia" and "trichomonas". Research articles published in English or Portuguese were included, specifically focusing on *in vitro* methodologies for evaluating the viability of trophozoites in *G. lamblia* and *T. vaginalis*. Studies addressing cyst viability or lacking explicit method descriptions were excluded, as were reviews, systematic reviews, and meta-analyses. No temporal restrictions were imposed, and the Preferred Reporting Items for a Systematic Review and Meta-Analyses (PRISMA) statement was followed. **Results:** The search identified 29 experimental studies with multiple viability assays. Only five methods were common to both parasites: a colorimetric approach (dye exclusion test with trypan blue), two fluorometric methods (resazurin and SYBR green I), and two morphophysiological methods (cell count and cell motility). **Conclusion:** The fluorometric resazurin method emerges as the most suitable choice for assessing trophozoite viability in both parasites, offering cost-effectiveness, flexibility, reliability, and ease of use. This method shows promise for standardized assessments of potential therapeutic compounds for *G. lamblia* and *T. vaginalis* infections.

Keywords: cell viability; *Giardia lamblia*; parasitic diseases; *Trichomonas vaginalis*; trophozoites.

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References

1. Leung, A.K.C.; Leung, A.A.M.; Wong, A.H.C.; Sergi, C.M.; Kam, J.K.M. Giardiasis: An Overview. *Recent Pat Inflamm Allergy Drug Discov.* 2019,13, 1–10.
2. Edwards, T.; Burke, P.; Smalley, H.; Hobbs, G. *Trichomonas vaginalis*: Clinical relevance, pathogenicity and diagnosis. *Crit Rev Microbiol.* 2014, 42, 1–12.
3. The Medical Letter. Drugs for Parasitic Infections. *Treat Guidel Med Lett.* 2013, 11, 9–21.
4. Sutrave, S.; Richter, M.H. The Truman Show for protozoan parasites: A review of in vitro cultivation platforms. *PLoS Negl Trop Dis.* 2021, 15, 1–21.