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# Recombinant expression and biophysical characterization of NAD-binding domain of S. mansoni Glyceraldehyde 3-phosphate dehydrogenase.

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Schistosomiasis is a devastating parasitic disease affecting over 200 million people globally and has the highest morbidity and mortality in sub-Saharan Africa. Praziquantel (PZQ) has been the only drug used to treat all schistosome infections because it is readily available, cost-effective, and has minimal side effects. Recent studies have shown that PZQ-resistant strains are emerging due to drug pressure. Other concerns are that PZQ does not kill the parasite during the reproduction stage, which is crucial because the disease directly results from eggs' entrapment in host tissue, thus increasing the individual's susceptibility to opportunistic infections. Therefore, it is critical to discover druggable targets and/or vaccine candidates for schistosomiasis. GAPDH is an enzyme found in the schistosome, which uses the NAD-binding domain component of its structure to generate energy motility and survival of the worm. Therefore, GAPDH is an important druggable target in the discovery and development of new anti-schistosomal agents. Therefore, the aim of this study is to recombinantly express and characterize the NAD-binding domain of GAPDH for future discovery, design, and development of new anti-schistosomal drugs. Competent JM109 bacteria cells were transformed with the NAD-binding domain of the GAPDH plasmid, followed by recombinant expression and affinity purification using a GST-Agarose column to obtain milligram quantities of the protein. Thereafter, biophysical characterization using FTIR and Raman spectroscopy was conducted immediately after in silico analysis. Overall, the S. mansoni NAD binding domain of GAPDH was successfully characterized to provide a structural basis for the development of new anti-schistosomal drugs. Additionally, in silico analysis revealed Triosephosphate isomerase and Phosphoglycerate kinase as interacting partners, which may be critical in the discovery and design of small molecule inhibitors and the subsequent development of these as new anti-schistosomal compounds.

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