Vaccine candidates, immuno-dominant antigens, and potent vaccine adjuvants for preventing cutaneous leishmaniasis: a sys

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Abstract

Background: Cutaneous leishmaniasis (CL) is the most common clinical form of leishmaniasis that causes skin disease. Currently, there is no licensed prophylactic vaccine for CL, as the mechanisms of healing and memory T-cell responses that develop after infection with CL are far from fully understood. A review of the published articles identifying CL vaccine candidates, immuno-dominant antigens, and potent vaccine adjuvants is needed to provide comprehensive information. Therefore, we aimed to review vaccine candidates, immuno-dominant antigens, and potent vaccine adjuvants for preventing cutaneous leishmaniasis. **Methods:** A systematic search of published studies before December 2023 was identified using electronic databases; PubMed/MEDLINE, Hinari Research4Life, Google Scholar, and direct Google search. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed. Data were extracted using a Microsoft Excel 2010 spreadsheet and data obtained were then reported using tables and figures and synthesized qualitatively. The quality of the included studies was assessed using the Joanna Briggs Institute's (JBI) quality appraisal tool for experimental studies. **Results:** The electronic databases search yielded 661 articles of which 32 articles met the inclusion criteria. The included articles were conducted in various animal and human models and included vaccine candidates, immuno-dominant antigens, and potent vaccine adjuvants. Some of the first-generation vaccine candidates showed complete protection of the specified animal model. They induced strong T-cell mediated and antibody-mediated humoral immune responses (e.g. Curdlan dectin-1, total *Leishmania* antigen (TLA), and *L. infantum* heat shock proteins (*ΛιΔΗΣΠ70-ΙΙ*)). Almost all second and third-generation vaccine candidates, and the immuno-dominant antigens of the parasite and the host enhance T cell-mediated and antibody-mediated immune responses. We also reviewed potent vaccine adjuvants such as *myrrh* silver nanoparticles (MSNPs), and Imiquimod, which play an important role in enhancing immune responses against *Leishmania* antigens. **Conclusion and recommendations:** The T-cell mediated immune response was significantly induced in various experimental models (e.g. IFN-γ and TNF-α response) and also the humoral arm in some instances (e.g. IgG2). This review thus provides comprehensive information on the efficacy and induction of protective immunity of vaccine candidates, antigenic molecules, and vaccine adjuvants against CL. However, there is still a need for a comprehensive understanding of the immuno-pathogenesis of the disease upon vaccination.

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