

What is the current progress on the development of a vaccine for visceral leishmaniasis?

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Introduction

- Leishmaniasis is a disease transmitted with the bite of an infected female phlebotomine sandfly.
- Visceral leishmaniasis being the most severe type of leishmaniasis is targeted for elimination as a public health problem to prevent mortality and morbidity. Although visceral leishmaniasis is curable, it becomes harder to cure as time passes, especially for individuals with weaker immune systems.
- Despite being readily available, the current treatment options for this neglected tropical disease are beset by problems such as drug toxicity, resistance, and expensive costs, which makes the development of a vaccine an urgent priority. (Moore & Lockwood, 2010)
- We conducted a thorough systematic review of the available research to see whether any advancements have been made in creating a visceral leishmaniasis vaccine that has proven safe, produces an immune response, and is affordable



Figure 3: An image of the phlebotomine sandfly (European Centre for Disease Prevention and Control [ECDC], Leishmaniasis 2010)

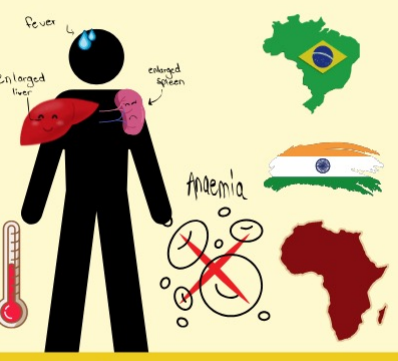


Figure 1: A child infected with visceral leishmaniasis (Courtenay et al. 2024)

Results and Discussions

Numerous clinical trial have been carried out that reflect upon the effectiveness, safety, immunological response and the cost effects, to ultimately create the next visceral leishmaniasis vaccine. The majority of cases of this parasite illness are found in low-income nations like Brazil and India (World Health Organisation [WHO], 2023). Though there are choices for therapy, many people cannot afford them, and even for those who can, the illness is growing more resistant to these medications (Khalil et al.). Thus, it is imperative to create a vaccine that is not only safe and effective but also reasonably priced so that a large population can receive it and capable of eliciting a powerful immune response. Numerous lives could be saved by such a vaccine, especially in areas like Sudan, where the primary cause of morbidity and death is visceral leishmaniasis (Khalil et al.). After looking through seven clinical trials, I found that many studies looked at different vaccine candidates, all attempting to meet these important requirements for safety, an immune response, and vaccine effectiveness.

Objectives

- Determine whether there has been research performed on the vaccinations for visceral leishmaniasis
- Understand the importance of putting a vaccine in place despite having treatments available for visceral leishmaniasis

Safety and immunological response:

- Four different clinical trials that were performed in humans (adults and children) were concluded to be noteworthy safety profiles as there was no side effects documented.
- Each vaccination had a different intensity and varied in the type of immune response.
- In one of the trials, it was documented that a patient did experience side effects. However, further trials need to be conducted to understand whether that is a side effect of the vaccine or if it was just that individual
- All of the vaccinations produced a tremendous and impressive immune response. This is crucial as the body will create antibodies and if it encounters the infection again, it will be able to fight against it. This discovery is particularly relevant for regions like Sudan where visceral leishmaniasis remains a major cause of sickness and mortality. If successful, the immunization could provide a necessary and perhaps life-saving alternative for individuals unable to get conventional medical care, representing a major advancement in public health for these underserved areas.

Methodology

Inclusion Criteria:	Clinical Trials (I, II, III) Randomized control trials (RCT) Case Reports Preclinical Trials Studies after 2000 Studies Involving Humans and Animals Reviews on Vaccine Development Include articles with Leishmania donovani
Exclusion Criteria:	Non-peer reviewed articles Studies related to treatment Studies on cutaneous leishmaniasis Studies on Vector control

Cheap:

- The cost-effectiveness of the vaccinations was a prominent topic in all. These vaccines have the capacity to elicit a potent immunological response. It is important to note that this heightened immune response may indicate the possibility of long-term protection and reduced cases of visceral leishmaniasis
- One clinical experiment that tested a vaccination on dogs. According to this trial, the vaccination generated a strong and durable immune response that prevented visceral leishmaniasis. If comparable outcomes are found in human studies, public health may create a breakthrough
- These vaccines elicit high and long lasting immunological responses, suggesting that there may be longer protection against visceral leishmaniasis and fewer vaccination shots required in the future.



I performed a review using the PUBMED search engine. I have included a detailed review of six clinical trials in the results and comments section. Using MeSH phrases such as "visceral leishmaniasis," "Leishmania donovani," "immunization," "immune response," "efficacy," "safety," and "cost,"

Conclusions

The reviewed clinical investigations show that significant progress has been made in developing vaccines against visceral leishmaniasis, particularly in low-resource environments. Most of the immunizations used to combat this dangerous parasitic disease had good safety ratings and incredible immune responses. Due to the vaccines' capacity to maintain immunity, fewer booster shots would be needed, which might be extremely advantageous for residents of low-income areas as it would lower the overall cost of immunizations and increase adherence to advised schedules. Moreover, the positive results of research conducted on non-human subjects, like dogs, underscore the potential for these vaccines to profoundly transform the trajectory of human and even animal health. If these vaccines prove effective in human trials, they could provide a practical and significant solution to the issues caused by visceral leishmaniasis, which now imposes a significant burden on affected populations. All things considered, the development and launch of these vaccines represent a major milestone in global public health, offering hope for improved disease management and improved living conditions for those who need them.



Figure 2: An image of 2 females infected with visceral leishmaniasis (Al-Kamel, 2016)



SCAN FOR REFERENCES