**Assessment of the Protective Effectiveness and Memory Immune Response of a One-Dose Hepatitis A Vaccination in Nicaraguan Children**

Author: Tera Branson
Major: Microbiology/ Cell and Molecular Biology
Department of Microbiology and Molecular Genetics, Oklahoma State University, Stillwater, OK 74078, USA

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**Abstract**

In this research article the researchers performed a 7.5 year long observational study of the protective effectiveness and memory immune response in Nicaraguan Children to a one-dose version of the Hepatitis A Vaccine. Hepatitis A Virus (HAV) is endemic in Nicaragua. In most countries, unlike Nicaragua, a two-dose version of the HAV vaccine is given to children, but in poverty stricken countries, like Nicaragua, this is not feasible. The point of this study is to try a one-dose HAV vaccination on a group of 130 children to see the protective effectiveness of it and to perform serological tests to see how effectively antibodies are being produced in response to the vaccine and if the immune system develops memory to this vaccine. In this study, the researchers performed a serosurvey and picked 130 children that came out seronegative for hepatitis A. They administered a one dose HAV and periodically performed clinical assessments and serological tests over a span of 7.5 years. During this time they concurrently tested the antibody production in each child for hepatitis A, these tests determined and proved the prevalence of Hepatitis A in Nicaragua. After 7.5 years the administered a booster vaccine of Hepatitis A. The results of the research proved that a one-dose version of HAV is effective, but it has some limitations.

**Introduction**

The article is highly relevant and important due to the fact that Hepatitis A is very prominent in poor countries, especially in countries where the population does not have access to clean water or ways to keep personal hygiene. This vaccine is usually given to children to start building immunity early because it is very devastating to adults and the elderly. Hepatitis A usually presents asymptomatically in children, but if adults become infected the implications are usually way more devastating. The infection is spread via human contact and through contaminated food and water. In Nicaragua, personal hygiene is limited and access to clean water is not readily available, these aspects make the spread of Hepatitis A abundant. Hepatitis A affects the liver and infected patients usually present with a fever and jaundice. In adults, this viral infection can lead to severe liver damage that is usually irreversible and could even lead to death from liver failure in more compromised individuals. The implication of a vaccine is highly essential in countries like Nicaragua because children are the primary carriers that end up being the source of infection in adults.

Hepatitis A virus is highly endemic in Nicaragua. Nicaragua is a resource-poor country and access to clean water is limited. Because of lack of personal hygiene and access to resources disease runs rampant in Nicaragua. Hepatitis A is one of them. A little history into the HAV vaccination: Many countries, such as the United States, Israel and China began giving toddlers universal mass vaccination (UMV) of a 2-dose inactivated HAV vaccination in the year 2000 (Mayorga, 2016). These countries almost completely eliminated HAV within a few years. The reason for targeting young children is because this virus can live in children and the children can be asymptomatic to it, but if the children contact older individuals they can attain the virus and it is more harmful. The UMV applied by these countries helped to provide herd immunity to the older individuals. In 2005, Argentina was the first country to administer a one-dose version of the HAV vaccine that would last 5-10 years to help stop circulation through the communities. Also, in the early 2000’s they discovered that adult travelers could receive a booster vaccination 5-8 years after receiving the first dose. The problem that had prompted questions and began this study was the question of whether this one-dose vaccination would suffice to protect individuals, especially children, living in constant exposure, due to the the HAV endemic.

**Recent Progress**

In 2005, they tested a set of children for HAV, they came out with 130 that were HAV-seronegative, meaning these children did not have the virus and did not have antibodies in their serum for HAV so they would be good candidates for this test. They gave each of these children one dose of virosomal HAV vaccine, thus beginning the study.

 Children that were seronegative were invited to participate in this study and written consent was obtained by their parents. The 130 children were administered a 0.5 mL dose of the Hepatitis A vaccine called “Epaxal”. Three months following the administration of the vaccine they came back in for serological testing and an assessment. Then each evaluation after that was given annually for 7 more years. In these evaluations they looked for serological changes, so antibody appearance in the blood and any signs of HAV infection. After 7.5 years, they did a full serological panel and statistical analysis on all children and found that 25 of the 130 had contracted Hepatitis A subclinically, meaning they had the virus, but did not express outward symptoms of it, they were asymptomatic. Out of all the kids, they determined the ones with higher risk of infection lived in homes with no refrigerators for food, no clean tap water and no toilets. At the end of this study, it was determined that the one-dose Hepatitis A vaccine was successful in producing a memory immune response in the children. The serological tests showed differing levels of antibodies, but overall they showed that for 2-3 years after the immunization antibody levels for HAV were high and started to decline the last few years of the test, but were still present in the serum. The results of these serological surveys after 7.5 years proved highly successful in protecting children and allowing them to build a memory immune response (Mayorga, 2016). This study finished in 2012 and the research article was officially finalized and published in 2016.

Another research article portrays similar research and results titled “Five-year follow-up of immune response after one or two doses of inactivated hepatitis A vaccine given at 1 year of age in the Mendoza Province of Argentina” (Benedetti, 2014). This article published in 2014, did a very similar study in Mendoza Province in Argentina. In this study, they had a much larger base of individuals participating in the study, approximately 546 people. Some of the individuals were given two-doses of HAV vaccine and some were given one-dose and they observed the differences. The other research only observed individuals after one-dose, this article still correlates because they found that even after comparison the results of the other article still stands. They found that one dose was very effective in protection and a memory immune response for about 5-10 years following vaccination. The major difference between the one-dose and two-dose vaccine was that the two-dose instilled a longer immune effect in the individual, but for individuals living in Hepatitis A endemic regions, the one-dose effectively helped to protect them from infection.

**Discussion**

The research from both articles brought about similar results, thus concluding that the study is highly viable. In countries like Nicaragua and Argentina their resources are very limited, access to clean water is rare. Food safety is not followed and personal hygiene is null, making the passing of infected bodily fluids very common. These countries are very poor, which is the basis for why they performed this study, because the two-dose Hepatitis A vaccine works very well at protecting immunized individuals, and builds a memory immune response. These countries cannot afford to give all of their citizens two doses of the medication, so these studies looked into what one dose of Epaxal could fulfill. Both studies came to the conclusion that one dose does, indeed, work at protecting the individual and helps to build antibodies to Hepatitis A. The main question or problem that arose from both studies was the fact that with one dose the serology tests showed a decrease in antibody levels after a few years. The antibodies did not deplete, but with the two-dose vaccine the levels stayed high even after 10 years, as shown in the latter research article. The main purpose surrounding this article was that the countries involved in the studies could not and still cannot afford the two-dose vaccine. The other problem is that Hepatitis A is endemic in these countries and with the countries not able to afford the two doses, this puts them in a dire position of needing a fix. This vaccine will be able to help by herd immunity through children to adults, it should be able to calm down the Hepatitis infection flowing through communities to where the risk is much lower. From the information provided in the research it explained that after the United States and other countries instilled UMV, they almost completely rid of their Hepatitis A endemic. Overall, this study came out successful in both articles. One dose of Hepatitis A vaccine will protect the immunized children and will help them to build antibodies against Hepatitis A. After about 5 years, another booster is recommended, but for a simpler and more cost effective implementation the one-dose HAV proves highly successful in starting to deplete this devastating endemic.

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