

# Exploring the Safety and Efficacy of the Dengue Vaccine

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## Abstract

Dengue vaccine has been shown to prevent this common infectious disease, but its safety and efficacy remain controversial. In this study, we explored the safety and efficacy of a dengue vaccine through a comprehensive analysis of the available literature and studies. We found that the dengue vaccine is effective in preventing dengue fever, but there may be some risks in some populations, such as pregnant women and children. In addition, we found some other safety concerns when using this vaccine, such as the occurrence of adverse reactions such as headache and fever. Our study provides important information about the safety and efficacy of dengue vaccine, which will help to further improve the use and promotion of this vaccine.

## Keywords

Dengue fever, Dengue vaccine, Safety, Efficacy.

## 1. INTRODUCTION

Dengue fever is transmitted by mosquitoes and occurs mainly in tropical regions of the world. It spreads rapidly around the world, posing a great threat to global public health.[1] Approximately half of the world's population is at risk of developing the disease. The development of this vaccine is necessary because of the impact and devastation caused by dengue fever worldwide. At present, several dengue vaccines are in clinical trials. Although dengue vaccines have been approved in some countries, they have not been licensed for widespread use. Due to the multiple serotypes and complex ecosystem transmission of the virus, the issue of safety and efficacy still requires in-depth research. This paper will explore the role of vaccines, discuss advances regarding the efficacy and safety of dengue vaccines. Thus we can gain a better understanding of the potential benefits and risks associated with using this vaccine.

## 2. DENGUE VACCINES

The dengue vaccine is now used in many countries as a preventive measure against the disease. The main function of the dengue vaccine is to induce the immune system to produce antibodies to fight the dengue virus. The development of a vaccine for dengue fever began in the 1950s. There are four serotypes of dengue virus and early research focused on developing a single vaccine to target all four dengue virus types. However, vaccination provided only short-term immune protection, so the vaccine gradually became unmarketable. In recent decades, new dengue vaccines have been developed that are expected to provide protection against all four serotypes. However, the interaction between the four serotypes remains the biggest obstacle to the development of a dengue vaccine. The introduction of a "Quadrivalent" dengue vaccine has brought about a turnaround. It is important to consider that, like all drugs, dengue vaccines have some side effects. As the dengue vaccine is developed and put into clinical practice, assessing its safety and efficacy is a necessary task.

### 3. VACCINE SAFETY

First of all, it is essential to consider the vaccine safety. The vaccine can cause pain at the injection site, fever and headache, which are the most common side effects. In addition, rare but serious side effects include allergic reactions, injection site erythema, weakness and arthritis. Trace back to the first vaccine previously developed by Sanofi. The vaccine was licensed in 2015 and the full name of the vaccine is "Chimeric Yellow fever-Dengue Dengvaxia® (CYD-TDV), is a live attenuated vaccine designed to chimerise yellow fever and dengue viruses. However, recent studies have found that this vaccine is only suitable for use in those who have been previously infected with the disease. [2] If this dengue vaccine is injected into people who have never previously been infected with the infection, approximately three years after vaccination, an individual suffering a natural dengue infection will cause a very severe reaction.[2] In 2022, Takeda partnered with the Indonesian government to promote a vaccine called QDENGGA®. The vaccine has been approved by the Indonesian National Drug and Food Administration (BPOM). This can be used in people infected or uninfected with the dengue virus. [3] Although there is a lack of clinical data to prove its safety, its safety is widely speculated to be high.

In order to evaluate the long-term safety of the Dengue Vaccine, it is important to consider several factors, including the duration of follow-up, the size of the study population, and the type of outcomes being studied. For example, studies that follow vaccinated individuals over a long period of time are necessary to determine the long-term safety of the vaccine. Furthermore, studies that involve large numbers of people are necessary to capture rare but potentially serious side effects. Finally, it is important to consider the types of outcomes being studied, such as serious adverse events, autoimmune diseases, and other long-term complications.

### 4. VACCINE EFFECTIVENESS

The effectiveness of the Dengue Vaccine has been studied extensively in clinical trials, with promising results. In one trial, researchers evaluated the vaccine's ability to prevent dengue infection in children aged 9-16 years. They found that the vaccine was highly effective, reducing the risk of dengue infection by up to 94%.[4] This result was observed across multiple regions and age groups, suggesting that the vaccine is effective in protecting against dengue infection. In addition to its efficacy in preventing dengue infection and hospitalization, the vaccine has also been studied for its potential to reduce dengue-related mortality. A recent trial found that the vaccine reduced the risk of dengue-related death by up to 85%, suggesting that it is highly effective in protecting against the most severe form of dengue infection. [5] Overall, the results of these studies indicate that the Dengue Vaccine is highly effective in protecting against dengue infection and its associated complications.

Studies have shown that the vaccine is most effective when both doses are administered, and the protection lasts for at least a year. [6] The World Health Organization (WHO) has recommended that the dengue vaccine be administered in two doses, with a gap of six months in between. This is to ensure that the vaccine is effective and that long-term protection is achieved.

### 5. CONCLUSION

As far as current research is concerned, a dengue outbreak is unpredictable. It can affect anyone living in or travelling to an endemic area. The high incidence of this disease can overwhelm public health systems and a safe and effective vaccine will be a key element of comprehensive global prevention and control. The dengue vaccine is highly immunogenic as well as the new vaccine available provides protection against all four serotypes of dengue fever. The vaccine is effective in preventing dengue infection, especially in people who have been

previously exposed to the virus. However, the long-term protection against dengue remains unknown. In the future, further studies will be needed to assess the long-term safety and effectiveness of the dengue vaccine.

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