

Chickenpox infection in adolescents

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ABSTRACT

Varicella-zoster virus (VZV), a member of the herpes virus family, mostly causes chickenpox infection in childhood and shingles in adulthood. Chickenpox has a high risk of transmission and severe viremia. It can lead to serious morbidity and even death in children. The chickenpox vaccine is produced in human diploid cell culture and can be safely administered even in those with severe egg allergy. A history of anaphylactic reaction to any of the vaccine components is an absolute contraindication. Other important contraindications for vaccination include pregnancy, immunodeficiency, use of immunosuppressive drugs, and active tuberculosis. The chickenpox vaccine can be administered concurrently with other childhood vaccines. If the vaccines to be administered are live parenteral vaccines, they should be administered on the same day or 28 days apart. If a PPD screening test is to be performed for tuberculosis diagnosis, it is recommended that the vaccine be administered on the same day and the test read 48-72 hours later. Concurrently with the chickenpox vaccine; If immunoglobulin, blood, or blood products are required, vaccination should be postponed. If vaccination has already been given, it should be repeated after the prescribed time, depending on the type and amount of product used. Since the VZV is susceptible to acyclovir, valacyclovir, and famciclovir, these antiviral drugs should be used one day before or 14 days after vaccination. Those working in crowded environments, including healthcare facilities, schools, child and elderly care centers, university students, military and security personnel, and teachers, are at risk of chickenpox infection and should definitely be vaccinated against chickenpox. Vaccination is the easiest and most reliable way to protect against chickenpox and shingles. Studies in countries where the vaccine is administered have shown significant reductions in chickenpox cases and the economic burden of the disease. In some countries, it has been reported that a single dose of the chickenpox vaccine provides high protection against moderate to severe chickenpox infection, but chickenpox cases are rarely seen after vaccination. A two-dose vaccine administration, however. It has been observed that it provides good protection against all forms of the disease, prevents transmission, and creates a high level of herd immunity. Therefore, we recommend restarting the two-dose vaccine administration in the national vaccination program implemented in our country.

Keywords: Chickenpox, herpes zoster, vaccination in adolescence

INTRODUCTION

The varicella-zoster virus (VZV) typically causes two different clinical presentations: chickenpox infection of varying severity in childhood and shingles infection in adults. The virus enters the body through respiratory secretions, vesicular fluid, or direct contact with lesions.^{1,2} In children, the disease manifests with fever and a widespread vesicular rash. With these characteristics, chickenpox has a high risk of transmission and severity of disease. As the child gets older, the disease becomes more severe and the risk of complications increases. Although it can be mild in childhood, severe clinical presentations and death can occur. In adults, varicella-zoster settles in the dorsal nerve ganglia; reactivation of the virus causes vesicular lesions to appear in dermatome areas; this is a clinical condition known as shingles.³

Chickenpox is usually not severe, but it can increase the risk of hospitalization and death in adolescents and adults. It can also lead to conditions such as pneumonia and encephalitis.

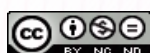
Approximately 90% of unvaccinated household members of an infected person contract chickenpox. The risk of contracting chickenpox is higher in people who are in close contact, such as school-aged children, students in other institutions, and those in crowded environments.⁴

CHICKENPOX

Epidemiology, Symptoms, and Risk Factors of Chickenpox

The most distinctive symptom of chickenpox is a rash consisting of itchy blisters that appear all over the body. The rash may spread to the mouth, other parts of the body, or the scalp. Chickenpox can also cause body aches, fever, and fatigue.^{4,5}

In the United States (US), prior to the introduction of routine vaccination, there were four million cases of chickenpox annually; of these, 10,000 required hospitalization due to



complications, and approximately 100 resulted in death.⁴ In our country, studies reporting the complications of chickenpox at the population level are extremely limited. A study conducted in İzmir reported that the risk of hospitalization for any complication among those who had contracted chickenpox was 6.3 per 100,000.³ In a study conducted by Dinleyici et al.⁵ across 27 centers in 14 provinces in our country between 2008 and 2010, it was reported that 824 children were hospitalized due to chickenpox complications, and 604 (73.3%) of these were previously healthy children with no underlying medical conditions. All susceptible patients in the hospital are at risk of infection.⁶⁻⁹

Prevalence of Chickenpox

There are numerous studies in the literature regarding the prevalence of chickenpox. In a study conducted in Spain in 2008 involving 1,324 children, the seroprevalence of chickenpox was found to be 82% among 5-9-year-olds, 91.1% among 10-14-year-olds, and 94.9% among 15-24-year-olds.⁷ In a study by Ronan et al.,⁷ approximately 70-80% of adolescents who reported not having had chickenpox were found to be positive for chickenpox antibodies. In a study by Kanra et al.,⁸ 80% of university students with no history of chickenpox were found to be positive for chickenpox antibodies.

CHICKENPOX VACCINE

The VZV vaccine, which contains a live attenuated virus, was derived from the OKA strain by Dr. Takahashi¹¹ at the Biken Institute in Osaka, Japan, in 1974. Currently, the monovalent vaccine produced from the OKA strain was first approved in Japan in 1987 and received a license in 1995 for use in healthy individuals aged 12 months and older who have not previously had the disease. All chickenpox vaccines are licensed for use in children aged 12 months and older. The recommended vaccination schedule for children involves two doses: the first dose between 12 and 15 months of age and the second dose between 4 and 6 years of age; however, in our country, the national vaccination schedule involves a single dose administered at 12 months of age. In particular, pregnant women, infants born to mothers who are not immune to chickenpox, those born before 28 weeks' gestation or weighing less than 1,000 grams (regardless of the mother's immune status), and those with immunodeficiency are at risk of severe varicella infection and complications. Those with no history of chickenpox or where there is uncertainty regarding their history should be considered susceptible; all healthcare staff should be vaccinated.⁶⁻⁹

Adverse effects following the varicella zoster vaccine include pain and redness at the injection site, fever, a rash near the injection site, a widespread rash over the body, herpes zoster infection, anaphylaxis, encephalitis, ataxia, erythema multiforme, Stevens-Johnson syndrome, pneumonia, thrombocytopenia, convulsions, neuropathy, and Guillain-Barré syndrome.⁹⁻¹¹

Contraindications for Vaccination

As the varicella vaccine is produced from human diploid cell cultures, it can be administered safely even in individuals with severe allergies to eggs or egg proteins.¹²⁻¹⁵ The vaccine is contraindicated in those with a history of anaphylactic reactions to any of its components (neomycin, gelatine, etc.) and during pregnancy.¹⁵ For individuals with hematological malignancies, solid tumors, or those

undergoing active chemotherapy; those with congenital or acquired T-lymphocyte disorders; those who have undergone solid organ or hematopoietic stem cell transplantation; and those using biological agents for autoimmune conditions, those using IL-1 receptor antagonists (anakinra), tumor necrosis factor-alpha inhibitors (etanercept, infliximab, and adalimumab) and anti-CD20 agents (rituximab), as well as those using immunosuppressive agents, and those receiving long-term high-dose systemic glucocorticoid therapy (such as those taking 2 mg/kg or more of prednisone or equivalent per day, or 20 mg/day of prednisone or equivalent for more than 14 days) in situations that may cause severe immunodeficiency, vaccination is contraindicated. The vaccine should also not be administered to those with untreated active tuberculosis.¹⁵⁻¹⁷

Points to Note Regarding Vaccination

The varicella vaccine can be administered at the same time as other childhood vaccines. If they cannot be administered simultaneously, there must be an interval of at least 28 days between the varicella vaccine and other live virus vaccines administered via a similar route. If a PPD screening test is to be performed, the recommended method is to administer the varicella vaccine on the same day and read the test 48-72 hours later. If they cannot be administered on the same day, there must be a 28-day interval between the test and vaccination. The varicella vaccine must be postponed for varying periods, depending on the type and dose of the immunoglobulin, blood, and blood products administered, as is the case with the measles vaccine. The varicella vaccine virus is sensitive to acyclovir, valacyclovir, and famciclovir; these antiviral agents should be avoided from one day before to 14 days after the day the vaccine is administered.¹⁴ For those planning a pregnancy, it is recommended to wait at least four weeks after vaccination. Given the very low transmissibility of the vaccine virus, the high likelihood of the pregnant woman being immune, and the benefit of vaccination in reducing the risk of transmission, it is considered appropriate to administer the varicella vaccine to children living in the same household if there is a pregnant woman in the home.¹⁹ Although it is not known whether Reye's syndrome is caused by the administration of salicylates following varicella vaccination, the vaccine manufacturer recommends that salicylates should not be used for at least six weeks after the VZV vaccine.^{13,18,19}

Who should have the Chickenpox Vaccine Outside of the Routine Childhood Schedule?

All young people and adults who lack chickenpox vaccination or have never had the disease, including those who are unsure, and adults at higher risk of exposure, such as those working in healthcare settings, schools, or childcare centers, as well as university students, teachers, and nursery staff, are included among those in communal work environments. to appear in dermatome areas; this is a clinical condition known as shingles.^{3,18,19}

CONCLUSION

As a result, routine vaccination programs in early childhood are cost-effective in terms of societal impact and healthcare efficiency. Because the specific costs and epidemiological conditions related to varicella vaccination vary significantly between countries, it is not possible to extrapolate results from one country to another. Therefore, country-specific sociodemographic and economic analyses are necessary.

In countries where the varicella vaccine is included in routine vaccination programs, efficacy studies have shown a significant reduction in varicella and shingles infections in adults, as well as a significant decrease in the economic burden associated with the disease. Scientific studies have shown that a single dose of the varicella vaccine provides high protection against moderate to severe varicella infection. However, for optimal protection against all forms of varicella, two doses are crucial; this prevents transmission, reduces new cases and the risk of outbreaks, and is of great importance in achieving herd immunity. The expected benefits of two doses of varicella vaccination can be expressed as a decrease in the incidence and complications of varicella, a decrease in the number of susceptible individuals, prevention of varicella disease despite vaccination, prevention of varicella outbreaks, and a decrease in the circulation of the wild-type virus. For all these benefits, we recommend that two doses of vaccine be reintroduced into the childhood vaccination schedule as part of our national immunization program.

ETHICAL DECLARATIONS

Peer Review Process

This review was externally peer-reviewed.

Conflict of Interest

The author declare no conflicts of interest.

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Author Contributions

The author is solely responsible for the conception, data collection, analysis, and writing of this manuscript.

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I was born in Ankara in 1969. I completed my primary, secondary, and high school education in Ankara. In 1994, I graduated from Eskişehir Osmangazi University Faculty of Medicine. In 2001, after completing a four-year pediatrics training program at the Ministry of Health Dr. Sami Ulus Children's Health and Diseases Training and Research Hospital, I became a specialist in Child Health and Diseases. Due to my mandatory state service, I worked at Aksaray Ortaköy State Hospital. In 2016, I was appointed as a faculty member at Ankara Yıldırım Beyazıt University Faculty of Medicine. In 2019, I completed my Master's degree in Social Pediatrics at Ankara University Faculty of Medicine. I received the title of Associate Professor in 2020. In 2020, I started working at Ankara Bilkent City Hospital. I received the title of Professor in 2025. I retired at the end of 2025 and simultaneously started working at Üsküdar University Faculty of Medicine.

