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Impact Of Varicella Vaccination On The Incident Of Varicella

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ABSTRACT
Varicella is an infectious disease caused by the varicella-zoster virus (VVZ). This viral infection affects the mucosa and skin. Varicella virus is spread mainly through the respiratory route and less commonly through direct contact with the lesions. Diagnosis of varicella can be made clinically through careful history taking and physical examination. WHO recommends general vaccination in places where chickenpox is still a public health problem. In Indonesia, varicella vaccine is still an optional immunisation group, not yet a mandatory immunisation programme by the government. . In some cases, people who have had the varicella vaccine may experience chickenpox again after direct contact with a person with chickenpox or direct infection with the varicella-zoster virus. However, people who have had the varicella vaccine tend to experience milder symptoms than people who have not had the vaccine.

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INTRODUCTION

Varicella is an infectious disease caused by the varicella-zoster virus (VVZ). This viral infection attacks the mucosa and skin. The varicella virus spreads mainly through the respiratory route and less often through direct contact with lesions (Ishaq NM, 2023). Varicella zoster virus infection causes two different clinical syndromes, namely varicella (chicken pox) and zoster (herpes zoster). Primary infection causes varicella, an acute exanthematous disease. The virus becomes latent in the dorsal root ganglion cells or cranial nerves and can reactivate, causing zoster (Karyanti MR, 2023).

The incidence of varicella occurs almost throughout the world and generally occurs in countries with temperate climates, such as the United States and England. Approximately 4 million cases of varicella occur with 100-150 deaths and more than 10,000 requiring hospitalization each year in the United States. The incidence of varicella in each country is not the same and the incidence in children is the most common. Before the age of 15 years, more than 90% of children are infected with the varicella virus (Syarpia RD, 2024). Although varicella is considered a mild disease, it causes an average of 11,000 to 13,500 hospitalizations (4.1-5.0 cases per 100,000 people) and 100 to 150 deaths per year (0.04-0.06 cases per 100,000 people). Hospitalization rates are approximately 4 times higher among adults, and mortality rates are much higher for adults (Margha NP, 2021).

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This risk is reduced by vaccination to stimulate the immune response towards maturity. Varicella infection is pandemic and highly contagious. Transmission is through respiratory droplets from people infected with the acute phase virus, the virus mixing with the air or direct contact with skin lesions from people (Siregar PA, 2023). The incubation period for varicella is 10-21 days. Prodromal symptoms may appear, especially in older children and adults (Marin M, 2021). Varicella attacks the skin and mucosa and is preceded by symptoms such as headache, fever and malaise which can last a week. Then it is accompanied by polymorphic skin lesions, especially in the central part of the body (Adista MA, 2023). Generally, there are constitutional symptoms and typical varicella lesions in the form of vesicles with a reddish base starting on the trunk and spreading centripetally to the face and scalp, often sparing the distal extremities (Prasetya D, 2020). Infection manifests as a generalized, pruritic, maculopapular, and vesicular rash, usually consisting of 250 to 500 skin lesions surrounded by an erythematous base (Dooling K, 2022). Primary maternal infection can cause clinical manifestations in the fetus and neonate. There are 3 forms of varicella zoster infection that can involve the fetus and neonate: congenital varicella syndrome, perinatal varicella infection, and neonatal varicella infection (Earlia N, 2022).

The diagnosis of varicella can be made clinically through careful history and physical examination (Ishaq NM, 2023). Active immunization is considered one of the most effective ways to prevent chicken pox. The varicella vaccine (VarV) was first approved for use in the United States in 1995, and varicella cases decreased 71-84% within 5 years in surveillance areas (Shi L, 2023). Surveillance is essential to assess the impact of vaccination programs and monitor changes in the epidemiology of chickenpox. National surveillance for chickenpox cases was not carried out at the start of the vaccination program because chickenpox is a common disease and is not known nationally (Marin M, 2022).

Results from two studies in England and Italy showed that complications that frequently occurred in adults included bacterial skin infections (11.25%), pneumonia (4.82%), febrile seizures (3.39%), and encephalitis (2 .44%). The incidence of complications as well as their severity increases with age (Shah HA et al, 2024). The first study in Japan to assess the impact following vaccine administration was a matched multicenter case-control study in children under 15 years, which reported effectiveness of 76% and 94% with one and two doses (Varela FH, 2019). From the above background, researchers are interested in knowing the impact of varicella vaccination on the incidence of varicella.

Impact Of Varicella Vaccination

Varicella is a vaccine-preventable disease. The World Health Organization (WHO) recommends the first dose of varicella vaccine at 12 to 18 months of age to reduce mortality and severe morbidity, and the second dose between 4 to 6 years to reduce cases and outbreaks (Kujawski SA, 2022).

Giving the varicella vaccine is an effort to prevent chickenpox or if it is affected it is less severe than those who do not receive the vaccine. According to the Indonesian Pediatrician Association, this vaccine is given over the age of 1 year with a frequency of 1 time, if the varicella vaccine has only been given over the age of 13 years then it is given twice with a distance of 4-8 weeks for the second administration (Udin F et al, 2023).

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WHO recommends general vaccination in places where chickenpox remains a public health problem. However, VarV has not been included in national immunization programs in many countries at present. Since 1999, Shanghai has introduced self-paying VarV. In 2017, Shanghai adjusted chickenpox vaccination to a two-dose procedure, and two-dose VarV has been included in the local immunization program since August 2018 (Shi L, 2023)

In Alberta, chickenpox vaccine was available through government purchase in 1999–2001, although coverage was less than 5% in 2001, indicating minimal vaccine uptake through private purchase. The chickenpox vaccine was added to the government-funded vaccination schedule in July 2001. (Rafferty E, 2021).

In 2012, the Japanese Society of Pediatricians recommended a two-dose vaccination regimen for children between 1 and 2 years old as voluntary immunization. Starting in October 2014, the Japanese government implemented the varicella vaccine as a routine immunization program, giving two doses at an interval of 3-6 months to children aged between 1 and 2 years. As a result, vaccination rates increased to 94.2% (first dose) and 70.3% (second dose) in 2018. After routine immunization, the number of chickenpox cases per sentinel site decreased substantially by 76.6% overall and 88 .2% among children aged 1-4 years in 2017. However, health care resource utilization (e.g., outpatient and inpatient visits, antiviral use, and direct health care costs) was associated with chickenpox cases and The incidence of herpes zoster cases among children in Japan after the introduction of routine immunization is still unknown. Previous studies investigating the impact of the chickenpox vaccine on the incidence of shingles have provided inconsistent results worldwide (Uda K, 2023).

METHODS

This research is a Literature Review research with a Narrative Review design. This method is used to identify, review, evaluate, and interpret all available research. By using this method, a systematic review and identification of journals can be carried out, with each process following predetermined steps or protocols.

RESULTS AND DISCUSSION

In Indonesia, varicella vaccine is still an optional immunization group, not yet an immunization program required by the government (Permenkes RI, 2017). The costs for this optional vaccination are borne by the community itself. The costs incurred for varicella immunization are quite expensive (reaching hundreds of thousands) and are not affordable for the lower middle class (Siregar PA, 2023).

Varicella vaccine (VV) has been introduced into childhood immunization programs overseas, including the United States (US) from 1995 and Australia from 2005 with significant reductions in morbidity, hospitalization and mortality. By 2005 in the US, the incidence of varicella had decreased by more than 90%. The varicella zoster vaccine is a live attenuated virus vaccine, which is derived from the Oka strain of the varicella-zoster virus. Vaccines are given I.M. or subcutaneous injection of 0.5 ml in the thigh or anterolateral deltoid area (Karyanti MR, 2023).

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Live varicella virus vaccine (Oka/Merck) was effective in preventing varicella (86%) compared with unvaccinated patients. In 2008-2009 in Germany, the incidence rate of varicella in children aged 2.9-5.2 years within seven days of treatment was 8% in children vaccinated with Oka/Merck and 48% in unvaccinated children. The effectiveness of the varicella vaccine is estimated to be around 70-90% against infection and 90-100% against moderate or severe varicella disease. The effectiveness of one dose of varicella vaccine provides approximately 99% protection against severe varicella disease and 80% protection against varicella disease of any severity (Karyanti MR, 2023).

The exogenous enhancement hypothesis, first introduced in 1965, stated that, in the absence of varicella vaccination, immunity would increase following childhood infection through reexposure to circulating virus. By reducing circulating virus, universal childhood chickenpox vaccination may have the undesirable side effect of allowing cell-mediated immunity in adults to wane in subsequent decades, thereby increasing the incidence of HZ. The epidemiology of varicella zoster virus infection depends on several parameters, with values that interact and evolve in different age groups, so that the potential effect of exogenous increases on the overall incidence of HZ is difficult to predict. Mathematical models incorporating exogenous increases have predicted a transient increase in the incidence of HZ, peaking 15–35 years after the start of chickenpox vaccination in adults who had experienced wild-type chickenpox virus infection as children. This makes vaccine policymakers in Europe and elsewhere cautious about recommending universal varicella vaccination (Wolfson LJ, 2020).

Research results by Qiu L in 2023 said insufficient vaccination coverage (37.1%) may have contributed in part to the increase in the annual incidence of varicella infection, and a shift of varicella cases to older age groups. The effectiveness of one dose of chickenpox vaccine is moderate and decreases over time. It is very important to increase chickenpox vaccine coverage to 80%. to reduce the incidence of chickenpox and prevent potential age shifts at the time of infection in China.

Several studies, one of which was research conducted by Irdan in 2020, stated that the results of implementing the two-dose VarV strategy were followed by a significant reduction in the incidence of chicken pox (-1.84% per month). After one year of the program, the incidence of chickenpox was estimated to decrease by 45.25%, which was higher in children (59.12% and 54.09%) than in adults (19.49%). These findings suggest that a two-dose immunization program is more effective in reducing the incidence of varicella compared with a one-dose vaccine, and interventions such as school closures are also recommended as additional measures to prevent varicella epidemics. (Shi L, 2023).

CONCLUSSION

Varicella is an infectious disease caused by the varicella-zoster virus (VVZ). To prevent and protect themselves from chickenpox, now children and adults can get a special varicella vaccination, namely the varicella vaccine. In some cases, people who have had the varicella vaccine may experience chickenpox again after direct contact with a smallpox sufferer or direct infection with the varicella-zoster virus. Even so, people who have had the varicella

vaccine tend to experience mild symptoms compared to people who have not been vaccinated.

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