



CHICKENPOX VACCINE : NEED OF THE HOUR IN DIFFERENT REGIONS OF JHARKHAND

Microbiology

Manoj Kumar	Professor, Department of Microbiology, RIMS, Ranchi, Jharkand -834009.
Kumari Seema	Assistant Professor, Department of Microbiology, RIMS, Ranchi, Jharkand -834009.
Shweta Singh*	Research Scientist –I (Medical), VRDL, Department of Microbiology, RIMS, Ranchi, Jharkand -834009. *Corresponding Author
Nikesh Sinha	Research Scientist –I (Non-Medical), VRDL, Department of Microbiology, RIMS, Ranchi, Jharkand -834009

ABSTRACT

Varicella (chickenpox) is caused by varicella zoster virus (VZV). Epidemiological profile of chickenpox varies considerably across different parts of world. In Jharkhand, chickenpox remains an important public health issue and outbreaks are not uncommon, since vaccination is not universal. **Aim:** To study different demographic variables in the outbreaks of chicken pox infection in Jharkhand from January 2017 to December 2020. **Methods:** Surveillance data were collected monthly, as a part of the Integrated Disease Surveillance program, India. The clinical definition of cases and outbreak were used for the surveillance rates and outbreaks. Chickenpox outbreaks were analyzed in different districts of Jharkhand for a period of 4 years (2017 - 2020) and trends were analyzed according to age, sex, residency and seasonality. **Results:** Three, fifteen, twenty four and seven Chickenpox outbreaks occurred in 2017, 2018, 2019 and 2020 respectively which caused fifteen, seventy six, one hundred and thirty seven and fifty two cases respectively altogether in Jharkhand. There was minor difference in occurrence among genders. A seasonal pattern was also observed. The age group of patients who were maximum affected were of 5-9 years followed by 10-14 years. **Conclusion:** A programme of varicella vaccination can potentially change the epidemiology of varicella and limit its burden in childhood as well as its social and financial cost.

KEYWORDS

Chickenpox; Surveillance; Outbreaks; India; India; Varicella Vaccine

Chicken pox (varicella) is the primary infection caused by Varicella Zoster Virus (VZV), a human herpes virus and it predominantly affects children, with highest incidence in the 1-9 years old age group [1]. Varicella is a highly contagious disease with an attack rate of 62-100% [1]. The virus is responsible for **chickenpox** (usually primary infection in non-immune hosts) and **herpes zoster or shingles** (following reactivation of latent infection). Chickenpox results in a skin rash that forms small, itchy blisters, which scabs over. It typically starts on the chest, back, and face then spreads. It is accompanied by fever, fatigue, pharyngitis, and headaches which usually last five to seven days. Complications include pneumonia, brain inflammation, and bacterial skin infections. The disease is more severe in adults than in children. Symptoms begin 10 to 21 days after exposure, but the average incubation period is about two weeks [2,3]. Varicella can be prevented by vaccination [1] which is safe and effective (in 80 - 85% against disease and in > 95% of cases in terms of preventing from serious complications) [4].

Although varicella occurs worldwide, there are differences in its epidemiological profile between various countries and especially between temperate and tropical regions. In pre-vaccination era, in temperate countries, like US and UK, more than 90% of people were affected before adolescence years [5]. However, in tropical climates, as little as half the population is exposed to VZV by adulthood [6]. Due to this later sero conversion in tropical countries more pregnant women are affected and this is of great concern because congenital varicella syndrome may occur. In addition, it is estimated that chickenpox is five times more likely to be fatal in pregnancy than in the non-pregnant adult [7]. VZV infection in adolescents and adults may be associated with higher morbidity and mortality than in children. VZV infection is frequent and can be severe in people infected with HIV/AIDS, and countries with a high incidence of HIV/AIDS may have a greater morbidity and mortality associated with VZV.

Another difference is that temperate regions show predominance of varicella infection in the winter and early spring [5]. Less seasonality is reported in tropics. Routine infant vaccination has substantially reduced transmission of wild-type varicella [8]; however, VZV vaccine is not a part of the Indian Universal Immunisation Program [9]. The chicken pox disease burden should receive serious consideration because of health, social and economical costs [10].

Our main objectives of this study were i) To describe the distribution of Chicken pox infections in Jharkhand region between 2017 -2020 ii) To make specific recommendations for Chicken Pox prevention and control and discuss the policy issues related to the Varicella Vaccination for the region of Jharkhand.

METHODS:

Case Definition For the purpose of this study : the clinical diagnosis was taken as the case definition a febrile illness with acute onset of diffuse-generalized maculo papulovesicular rash without other apparent cause [13].

Outbreak was defined as ≥ 5 varicella cases that are related in place and are epidemiologically linked [13].

Blood samples received in our laboratory from different districts of Jharkhand through IDSP Programme were tested for anti- VZV IgM by ELISA.

RESULTS :

Table 1. Number Of Outbreaks Every Year

Year	2017	2018	2019	2020
Number of outbreaks	3	15	24	7*

*in year 2020 cases were reported less due to Covid.

The number of outbreak attacks also increased (three, fifteen, twenty four and seven outbreaks).

Table 2. Number Of Cases Occuring Every Year During Outbreak

Year	2017	2018	2019	2020
Number of cases	15	76	137	52*

*in year 2020 cases were reported less due to Covid

During a four-year period, from January, 2017 to December, 2020, in Jharkhand region we reported an increasing rate of cases (fifteen, seventy six, one hundred and thirty seven and fifty two cases respectively in calendar years)

Distribution of cases among different age groups : In 2017, the maximum number of cases occurred in age group of 10-14 years. In 2018, the maximum number of cases occurred in age group of 15- 19

years followed by 20-24 years, 10-14 years and 5-9 years of age group. In 2019, maximum cases occurred in 5-9 years of age group followed by 10-14 years, 20-24 years and 15-19 years of age group. In 2020, maximum cases occurred in 5-9 years followed by 15-19 years of age group.

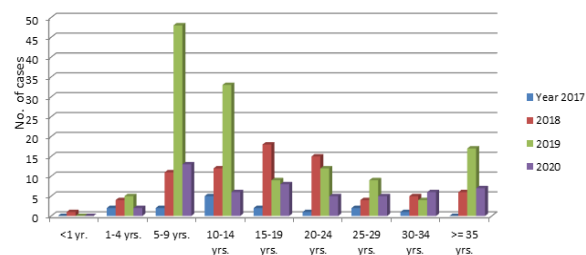


Figure 1: Distribution Of Number Of Cases In Different Age Groups From Year 2017-2020

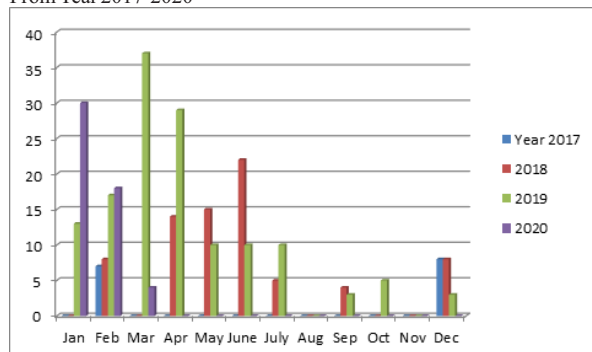


Figure 2: Distribution Of Number Of Cases In Different Months Of Year 2017-2020

Interestingly, there is a clear seasonal pattern in VZV occurrence. In the year 2017, the peak months of outbreaks have been the months of February and December. In 2018, maximum cases occurred in June, followed by months of May and April. In 2019, it has been March, followed by April, February and January.

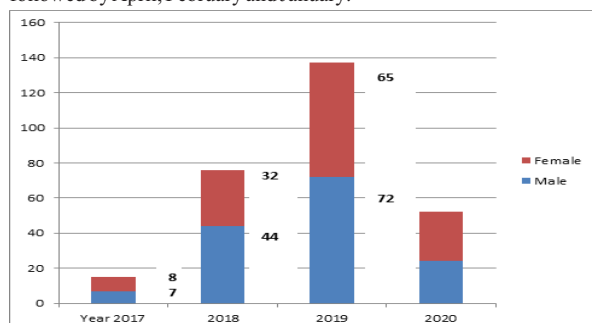


Figure 3: Distribution Of Number Of Cases Among Male And Female Year 2017-2020

The male to female ratio was 0.875 in 2017, 1.375 in 2018, 1.107 in 2019 and 0.857 in 2020.

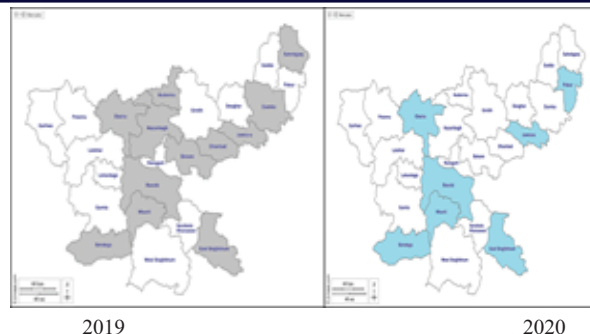
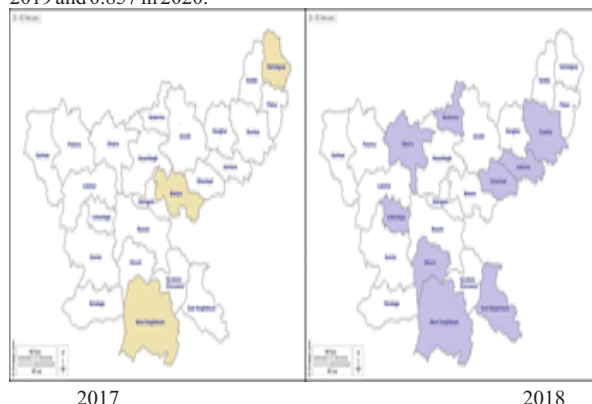


Figure 4 : Distribution Of Cases Among Different District Of Jharkhand In The Year 2017-2020

DISCUSSION:

In the present study, we reported an increasing trend of chicken pox cases and ongoing outbreaks in the state of Jharkhand, during a four year passive surveillance study period (2017-2020). In 2017, the maximum number of cases occurred in age group of 10-14 years. In 2018, the maximum number of cases occurred in age group of 15-19 years followed by 20-24 years, 10-14 years and 5-9 years of age group. In 2019, maximum cases occurred in 5-9 years of age group followed by 10-14 years, 20-24 years and 15-19 years of age group. In 2020, maximum cases occurred in 5-9 years followed by 15-19 years of age group.

Both genders were almost equally affected and there was a seasonal pattern in the occurrence of cases of chickenpox. In addition, most studies describe no gender difference in sero positivity [1] and this agrees with our findings.

Chickenpox outbreaks in India are not uncommon [11,14]. Sinha et al reported chickenpox outbreaks which were observed every year from 1970 - 74 in a small West Bengal village and the cases occurred between March and June with a mean age of 23.4 years [15]. Comparing with these studies with our results we notice a slight shift to the lower mean age in our region. There is a clear seasonal pattern in VZV occurrence. In the year 2017, the peak months of outbreaks were in the months of February and December. In 2018, maximum cases occurred in June, followed by months of May and April. In 2019, it has been March, followed by April, February and January. In a number of studies, incidence was found to peak during the cooler times of the year while dropping off in the summer months. In a previous epidemic in Kerala White [16] it was found that most varicella cases are reported between January and February, the coolest months of the year [17]. Other studies have found also a seasonality pattern but results are inconsistent among different districts regarding months that incidence peaks [18,11].

In India, varicella vaccination has not yet been included in the national immunization schedule [19]. The coverage percentage in our region is unknown. Varicella vaccine is known to be effective and there is even more benefit from the second dose which gives lasting effect [26]. There is an ongoing research and discussion towards implementing the best strategy vaccination tailored to the needs of each county, with the trend towards universal, high sustained coverage as a cost-effective method [28-31]. The US was also the first country also to adopt a universal routine two dose varicella vaccination program; other countries implemented universal 1-dose programs as a routine schedule. A high proportion of unvaccinated case-patients suggest low vaccination coverage as a cause of the outbreak. The varicella vaccine does not provide 100% protection; it is expected that cases will occur among vaccinated persons, although disease is generally milder than that in unvaccinated persons as has been observed in immunized case patients [32].

Immunization is probably most effective public health measures in childhood morbidity and mortality, caused by vaccine preventable diseases. As WHO concluded [33] before countries decide on the introduction of varicella vaccine into routine childhood immunization programmes, they should set up adequate disease surveillance to assess the varicella disease burden, with provision of continued surveillance after introduction of vaccination. Those countries deciding to introduce routine childhood varicella immunization, should administer vaccination at 12 – 18 months of age. The number of

doses administered is dependent on the goal of the vaccination programme. One dose is sufficient to reduce mortality and severe morbidity from varicella. Two doses induce higher effectiveness and should therefore be recommended in countries where the programmatic goal is, in addition to decreasing severe disease, to further reduce the number of cases and outbreaks.

Conclusion : There are lack of prevention and control strategy for varicella in India including Jharkhand. Also, there is a need for regular training programmes of health care workers of different district of Jharkhand so that highly contagious communicable diseases like varicella can be identified, detected in time and such outbreaks can be prevented for further spread within the community.

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