Sir,

Chickenpox or varicella is an acute, highly infectious disease caused by human (alpha) herpes virus 3, also called varicella zoster virus (VZV) belonging to the family Herpesviridae. Human beings are the only known hosts of this virus. It is worldwide in distribution and occurs in both epidemic and endemic forms. VZV is transmitted by close contact, by inhalation of aerosols from vesicular lesions, and possibly through respiratory secretions. Chickenpox is a common and mostly mild disease in children though it can cause severe illness in adults, pregnant women, immunocompromised individuals, and neonates. The primary infection presents as fever and exanthematos rash but can affect almost any organ of the body. The incubation period (IP) usually ranges from 7 to 23 days (the mean IP is 2 weeks). It is highly contagious with secondary attack rate in household contacts >90%. A clinically apparent infection usually provides lifelong immunity. The long-term consequences of the disease include the development of herpes zoster, which occurs due to reactivation of latent varicella infection.

Chickenpox occurs throughout the year in the temperate regions where it commonly affects children between 1 and 14 years of age. The prevalence of the disease in the temperate regions is 13–16/1000 people per year. In tropical regions, the disease commonly occurs during the colder seasons, such as winter and spring, and affects mostly adolescents and young adults. Chickenpox is one of the common causes of vaccine-preventable deaths in children. The chickenpox vaccine is available commercially and may protect 85% of cases of chickenpox and 95% of cases of severe secondary consequences. Before 1995, nearly 4 million cases of chickenpox were reported each year in the United States, leading to 11,000 hospital admissions and 100 deaths. However, the introduction of universal vaccination in many countries such as Japan, Korea, and the United States of America has led to a marked reduction in the varicella incidence, its associated complications, hospitalizations, and case-fatality rate.

The chickenpox vaccine is not a part of the Universal Immunization Programme in India; therefore, the outbreaks of chickenpox continue to occur in the unvaccinated rural population.

This present study reports an outbreak of varicella occurred in City Center locality of Gwalior. Viral Research and Diagnostic Laboratory (VRDL) of Gajra Raja Medical College Gwalior caters to approximately a population of 55–60 lakhs. The houses in the outbreak area are double or triple storied having 5–10 rooms. Each room is occupied by an individual household, which includes 4–8 family members. Overcrowding, poor ventilation, and lower educational status possibly promoted the spread of the virus in the locality.

VRDL was informed of an outbreak of fever with rash in City Center in the 4th week of February 2020 by civil authority. Investigators of VRDL carried out active surveillance of the affected locality, and approximately 90–100 households were screened for new cases. The contact tracing is done by snowball’s sampling method. The first case came in contact with the investigator was asked about his/her contact and travel history. Blood samples were collected from 16 suspected patients as a part of the outbreak investigation. A clinical case of chickenpox is defined as “the occurrence of fever with maculopapular rash in any person of any age.” A confirmed case was defined as any case clinically suggestive of chickenpox along with laboratory confirmation of the disease by serology.

All blood samples were collected after taking informed written consent from the adult cases and the parents in case of minor children. The samples were transported to the virology laboratory in the cold chain. Sera were separated and stored at −70°C in aliquots until tested. The VZV-specific IgM antibodies were detected using commercially available kits – VZV IgM Capture Enzyme-Linked Immunosorbent Assay (ELISA) as per the manufacturer’s instructions.

Out of 16 cases, only five were laboratory-confirmed cases of chickenpox detected in the present outbreak. The age of the patients ranged from 8 to 18 years (mean age – 14 years). All cases were ≤18 years old. Of the five laboratory-confirmed cases, two were male, and three were female (M: F ratio-2:3). The typical clinical manifestations observed were fever (100%), rash (100%), and body ache (100%). The rash was generalized in 100% of cases, and the first site of eruption was the trunk. The typical presentation was vesicles (40%) followed by a maculopapular rash (60%). History of vaccination against VZV was not known. All the cases recovered spontaneously with no complications. Five (31.25%) out of 16 cases were positive for the VZV IgM ELISA, and one (6.25%) showed the equivocal result.

This study describes a focal outbreak of chickenpox that occurred within the City Center locality of Gwalior. This area is overcrowded with the residents living in poorly designed houses with poor ventilation amenities, which led to the spread of VZV.

Chickenpox outbreaks had been reported worldwide and also from India. Sood in 2013 from Rajasthan reported a pandemic with an index case of a 23-year-old renal-transplant recipient who affect 14 healthcare workers in the hospital. Singh...
et al. in 2011 had reported a community-wide outbreak near Chandigarh wherein 162 cases occurred.[6]

The present outbreak was traced back to the index case, which was an 18-year-old female. The disease spread to her household and neighborhood contacts. Most of the affected cases were the school-age children, which is typical of chickenpox. They had characteristic vesicular lesions, which were commonly seen on the trunk and a few lesions on extremities.

A total of five laboratory-confirmed cases of varicella occurred in the present outbreak. The typical laboratory diagnosis of VZV rests on the detection of VZV-specific IgM antibody, which could be positive in 5 (31.25%) cases and equivocal in 1 (6.25%) case.

Singh et al. reported an outbreak of chickenpox that occurred in the early winter season.[3] An ideal setting for the spread of chickenpox infection was the low ambient temperature in winter, and people living in proximity contributes to the rapid transmission of the virus.

The present outbreak occurred within the late winter/spring season. The first case was reported on February 19, 2020, when the ambient temperature range was 32°C maximum and 13°C minimum on that day. The maximum and minimum temperature of the Gwalior city was continuously falling for the coming 7 days. Ten days before the outbreak, there was a temperature variation of 22°C–31°C as per the AccuWeather forecast report, as shown in Figure 1.

Although, in India, many preparations of vaccine are available in the private sector and as per recommendation, the first dose should be administered at 15 months of age followed by the second dose at 4–6 years of age. A minimum of 86%–91% vaccination coverage is needed to develop herd immunity to stop outbreaks.[6]

**Conclusion**

The inadequate vaccination coverage, low ambient temperature during winters together with overcrowding, and the poor hygiene practice of the population facilitated the natural spread of the virus within the community. The present outbreak highlights the need of varicella vaccine in the city. Although the outbreak reported is very small, it reflects the low awareness of the varicella vaccine in the general population.

**Acknowledgment**

We acknowledge the contribution of Department of Health Research ICNR and Regional VRDL, AIIMS, Bhopal.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Singh MP, Chandran C, Sarwa A, Kumar A, Gupta M, Raj A, et al. Outbreak of chickenpox in a Union Territory of North India. Indian J Med Microbiol 2015;33:524-7.

2. Zhang XS, Smith A, Patel B, Anderson C, Pomeroy L, Higgins G, et al. New approaches to controlling an outbreak of chickenpox in a large immigration detention setting in England: The role of serological testing and mathematical modelling. Epidemiol Infect 2020;148:1-7.

3. Singh MP, Singh G, Kumar A, Singh A, Ratho RK. Epidemiologic lessons: Chickenpox outbreak investigation in a rural community around Chandigarh, North India. Indian J Pathol Microbiol 2011;54:772-4.

4. Prevention of varicella. Update recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep 1999;48:1-5.

5. Sood S. Occupationally related outbreak of chickenpox in hospital staff: A learning experience. J Clin Diagn Res 2013;7:2294-5.

6. Plans-Rubiò P. Evaluation of the establishment of herd immunity in the population by means of serological surveys and vaccination coverage. Hum Vaccin Immunother 2012;8:184-8.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.