



## Epidemiological Outbreak Investigation of Chickenpox in Village Khairi, Balodabazar, Chhattisgarh

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### ABSTRACT :

**Background:** The varicella zoster virus (VZV) causes the acute, highly contagious disease known as chickenpox. On 21st January 2023, from a MO (Medical Officer), a 49-year-old man with a probable chickenpox case with more than 100 rashes from, a village- khairi, Block Balodabazar. This outbreak investigation was conducted to describe chickenpox distribution of cases in terms of person, place and time and implement immediate control and preventive measures.

**Methods:** A case was defined any age present fluid-filled vesicular or maculo-papular rash with fever, sore throat, and weakness occurring in Khairi village during 21st January 2023 to 08th February 2023. We collected blood/vesicular fluid Swab samples and samples were tested for VZV IgM ELISA. Data were collected using a questionnaire comprising of socio-demographic characteristics and clinical features

**Results:** A total of 61 cases from 509 population were affected by chickenpox with an attack rate of 11.9% with zero death were reported from 21st January 2023 to 8th February 2023. Out of total reported cases 38 (80.7%) were males and the remaining 23 (37.7%) were females. 67.2% of the total reported cases were children under the age of fifteen. The commonest age group affected was 1 to 15 years. The blood/vesicular fluid Swab samples were tested for VZV IgM ELISA and found 100 % patients positive for VZV.

**Conclusions:** The findings of this investigation determined that the presence of a chickenpox outbreak. The illness was caused by an infection with chickenpox, which was the cause of the symptoms. Immediate preventive and control measures were recommended to pause the spread of the disease. Health education and awareness regarding the preventive measures of disease should be promoted.

**Keywords:** Chickenpox, Outbreak Investigation, Chhattisgarh

### Introduction :

Chickenpox is an acute, highly contagious disease caused by the varicella-zoster virus (VZV) (Khan, *et al.* 2024) a member of the herpesvirus family. Chickenpox produces a skin rash with tiny, itchy blisters that heal over. It usually begins on the chest, back, and face, then spreads. Symptoms include fever, tiredness, pharyngitis, and headaches, which typically last 5-7 days. Complications include pneumonia, brain inflammation, and bacterial skin infections. The condition is more severe in adults than in youngsters. Symptoms appear 10-21 days after exposure, with an average incubation period of roughly 2 weeks. (Ayoade, F., & Kumar, S. 2017). It usually takes about a week for all of the blisters to turn out to be scabs. Some people who have been immunized against chickenpox can still contract the disease. However, they usually have lesser symptoms (CDC April 2024). The most common mode of transmission is airborne, but it can also occur through aerosols and direct contact with skin lesions. Generally, the infection is self-limiting and gives the individuals with permanent immunity. (Pall, S., & Kumar, D. 2018). It may be incurable, particularly in neonates and in immunocompromised persons. In temperate climates most instances happen before the age of 10 (WHO 2024). A clinically detectable infection typically offers lifelong immunity. The disease affects 13-16/1000 persons in temperate climates each year. In tropical countries, the disease frequently arises during the colder seasons, such as winter and spring, and predominantly affects teens and young adults. (Misra, Vaibhav, et al 2021). Chicken pox has been a notifiable disease in India since 2005 under the Integrated Disease Surveillance Project (IDSP), although published data on chicken pox epidemiology in India is sparse. According to anecdotal evidence, this could be due to considerably fewer incidents being reported than really occurring.<sup>14</sup> The problem with reporting incidents includes ignorance, lack of enthusiasm among field workers, and fear of punitive action. (Pall, S., & Kumar, D. 2018). According to the Integrated Disease Surveillance Programme (IDSP), there were 126 outbreaks in Chhattisgarh in 2023, of which 23 (or 18.3%) were connected with chickenpox. (IDSP 2023).

During the latter week of January 2023, received information from a MO (Medical Officer), a 49-year-old male with a suspected chickenpox case with more than 100 rashes from, village- Khairi, Block Balodabazar. However, it was brought to our attention on January 21, 2023, due to a lack of reporting of these occurrences in the weekly forms of the subcentre (S form) and the Primary Health Centre (P Form). On the basis of these details, the block RRT was visited affected area and those who had reported cases of chickenpox were interviewed. They also revealed that there were further cases of the

patient's age, gender, date of illness onset. When it was brought to the notice of district officials, it was decided to undertake an outbreak investigation by District Rapid Response team of Balodabazar. We describe the epidemiological and laboratory investigations, control measures and validity of reported history of chickenpox infection. No complications, hospitalisations or deaths occurred.

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## Materials and Methods

District Surveillance Unit received information on 21st January 2023, from a MO (Medical Officer), a 49-year-old man with a probable chickenpox case with more than 100 rashes from, village- Khairi, Block Balodabazar. On receipt of this information, District RRT was deployed and immediately contacted the near PHC-Lahod and SHC-Khairinda to gather information on probable cases from the village. The RRT team visited the area on 22nd January 2023 and found 08 more probable cases of chickenpox. house-to-house survey was started During the survey, they found more probable cases from village Khairi.

### Setting

The gram panchayat village of Khairi has 509 populations overall, of which 271 are male and 238 are female. There are 49.1% females and 50.8% males in Khairi Village's 285 54.67% literate population. The community of Saloni has roughly 119 houses. It takes 15 kilometres to get to the closest medical facility for the village's population.

### Case finding

Case of Chickenpox for this outbreak was defined "a case of any age present fluid-filled vesicular or maculo-papular rash with fever, sore throat, and weakness occurring in Khairi village during 21st January 2023 to 08<sup>th</sup> February 2023." In order to look for cases, we surveyed every home in Khairi, gathering data on symptoms, age, gender, date of sickness onset, and past medical history.

### Human laboratory investigation

We collected blood/vesicular fluid Swab samples from cases presenting with rashes with fever, sore throat, only fever and weakness and sent them state level VDRL Department of Microbiology AIIMS, Raipur, Chhattisgarh.

### Data Analysis

Basic demographic information about household members was gathered, and cases were identified through the use of a questionnaire designed for reported cases of chickenpox were interviewed. Line listing of each case was done in terms of time, place and person. All the collected data were entered and analysed in Microsoft Excel 2021. Data were summarized in terms of percentage and frequency distribution tables and graphical methods of presentation of data including the epidemic curve. The disease's attack rates specific to sex were calculated. In order to make conclusions, an epidemic curve was created and the data were examined.

### Action taken

The investigation was initiated on 8th March 2016A preliminary assessment of the area was conducted on January 21, 2023, by a team of District Surveillance officers, District Epidemiologist, District Microbiologist, Block Medical Officer, and community and rural health officers. The local panchayat was given instructions for muniyadi about personal hygiene, the importance of frequent hand washing, cough etiquette, restriction of movements and avoiding mass gatherings. School teachers and principal were sensitized about the chickenpox. interviews on the various aspects related to varicella/chickenpox infection were done with the people infected, their exposed contacts, their family members, all cases were treated symptomatically.

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## Results

### Demographic Characteristics

Descriptive analysis identified 509 affected population. There were 61 cases of Chickenpox with an attack rate of 11.9% with zero death were reported from 21<sup>st</sup> January 2023 to 8<sup>th</sup> February 2023 in village Khairi. Out of total reported cases 38 (80.7%) were males and the remaining 23 (37.7%) were females. 67.2% of the total reported cases were children under the age of fifteen. The median age was 31 years (range: 1–70 years) (Table no. 1). The sex specific attack rate was higher in male (14%) than females (9.7%) (Table no. 2). The first case was reported by medical officer on January 21, 2023. The maximum number of cases was reported on January 25, 2023 (figure no. 2). The most common clinical manifestations observed were rashes (93.4%), fever with rashes (55.7%), itching and rashes (23%) and sore throat (6.7%). The rash was generalized in all cases, with the majority of patients (50.8%) developing it on their trunk. The majority (52.5%) of the patients presenting more than 50 lesions. Most of the affected people received treatment (82%) from government hospital (31.1%), quack (26.2%), traditional healer (19.7%), not received treatment from any other sources (18%), private hospital (4.9%) (Table no.3). Index case was a male child aged 9 years who spread the disease to home-mates and other school mates belonging

to same area and then to others in the community. Cases were occurring in spurt and in clusters and many had already healed that were not reported. All patients had a history of contact with chickenpox. All of the cases recovered spontaneously, with no serious problems. Cases were occurring in spurts and clusters, and many had already healed, but were not documented..

### Laboratory investigation

11 samples from suspected cases in Khairi village blocks Balodabazar respectively were collected for lab confirmation. All samples were confirmed in State level VDRL Department of Microbiology AIIMS, Raipur Lab. All samples were VZV IgM ELISA positive. The disease afflicted almost all the age group but the incidence was more in the age group 1-15 years. None of the cases was hospitalised, and none of them reported any complications. Based on their clinical symptom's treatment was given by physicians.

**Table 1: Socio-Demographic Profile**

Variables		Frequency (n=26)	%
Age (In Years)	0-5 Years	15	24.6
	06-10 Years	22	36.1
	11-19 Years	11	18.0
	20-45 Years	4	6.6
	45-60 Years	8	13.1
	Above 60 Years	1	1.6
Sex	Male	38	62.3
	Female	23	37.7
Occupation	Farmer	8	13.1
	Student	31	50.8
	Housewife	9	14.8
	Unemployed	11	18.0
	Daily wages	2	3.3
Educational Level	Illiterate	21	34.4
	Primary Education	28	45.9
	Middle Education	5	8.2
	Higher Education	3	4.9
	Graduation	4	6.6

**Table 2: Sex specific attack rate.**

Village	Population at risk	Cases	Attack Rate	Attack Rate for Males	Atta Attack Rate for females
Khairi	509	61	11.9%	14	9.7

**Table 3: Characteristics Variables of Cases**

Variables		Frequency (n=26)	%
Symptoms	Rashes	57	93.4
	Itching and Rashes	14	23.0
	Fever with Rash	34	55.7
	Sore Throat	4	6.6
Whether treatment received	Yes	50	82.0

	No	11	18.0
<b>Treatment Recived source</b>	Govt Hospital	19	31.1
	Private Hospital	3	4.9
	Quack	16	26.2
	Traditional Healer	12	19.7
	Not Received from any sources	11	18.0
<b>No of Lesions</b>	Less than 10	2	3.3
	more than 10	27	44.3
	more than 50	32	52.5
<b>Site of Rash</b>	Trunk	31	50.8
	Face	8	13.1
	All over the body	22	36.1

Figure 1: Clinical Features among cases

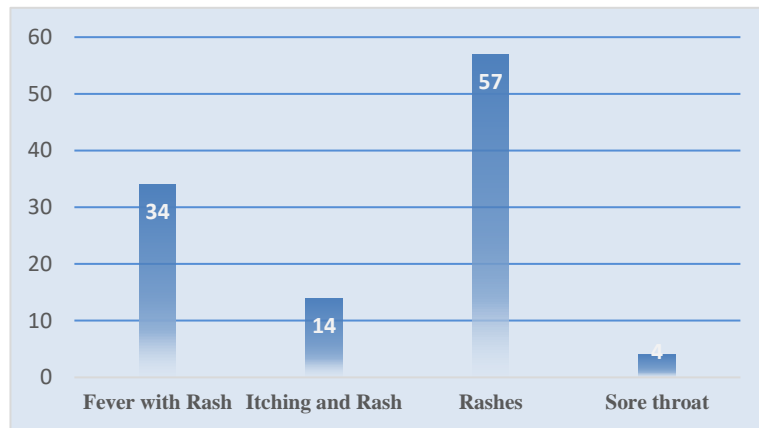
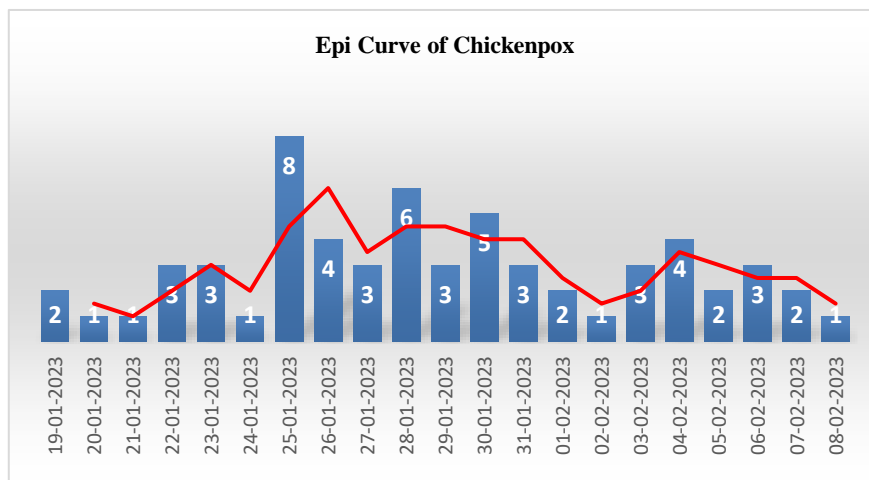


Figure 2: Epidemic curve of Chickenpox.



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## Discussion :

The present investigation describes the outbreak of the chicken pox epidemic that occurred in a rural village- Khairi (Balodabazar, Chhattisgarh), India which is located on the peripheries of city in Balodabazar. The first incidence was reported on 21st January 2023 in Khairi Village. The average seasonal peak of varicella infections in southern India is from January to April. (Mourya, Devendra T., et al. 2019). The peak incidence during this investigation occurred between January to March. Similarly, the systematic review in Asian countries found that the incidence peaked in January in Taiwan and in March in India. (Minhas, Akshay, et al. 2022). Similarly, the maximum number of cases and outbreaks occurred in the winter and spring months (January–April), whereas the lowest number of cases occurred in the summer and fall months. (June–November) ((Khan, *et al.* 2024)).

Present investigation shows that among the suspected cases, 38 were males (62.3%) and 23 were females (37.7%). However, the attack rate was higher in male (14%) than females (9.7%). Similarly, the study reported 96 were males (64.4%) and 53 were females (35.6%) and the attack rate was higher in males (22.1%) than females (12.6%) (Vaidya, S. R., et al 2018) and Sex-specific AR was (23%) more in boys (Gupta, S. N., Gupta, N., & Gupta, S. 2015).

In this investigation we found that the most common clinical manifestations observed were rash (93.4%), fever with rashes (55.7%), itching and rashes (23%) and sore throat (6.7%). Similarly in the study of Mishra, R. 2017 were rash (100%), fever (88%) and headache (24%). Due to traditional treatments, 18% of the sick population did not obtain treatment from any other source, as observed during the investigation, when the team struggled to provide treatment and collect samples. Similarly reported the study in which many refuse to receive treatment for chickenpox due to traditional treatments. (Kujur, A., Kiran, K. A., & Kujur, M. 2022).

The rash was generalized in all of the cases, and the first site was the trunk in the majority (50.8%) followed by face (13%) and all over the body (36.1%) of the patients. Majority (52.5%) of the patients presented more than 50 lesions followed by >10 lesions (44.3%) and <10 lesions (3.3%), similarly reported Mishra, R. (2017) study.

Due to patients' refusal a total of 11 samples were collected. Out of 11 samples, all samples were found to be positive for varicella-zoster infection using the ELISA method. Kujur, A., Kiran, K. A., & Kujur, M. (2022) study reported that out of 31 samples, 21 tested positives for varicella-zoster infection using the ELISA method. This could be because IgM antibodies are usually detected one to two weeks after the first infection. All of the patients had had contact with a case of chickenpox, but none had ever been immunized against VZV. The vast majority of cases resolved on their own, with no major challenges or consequences. This study supported that adults 9 (21.3%) also suffer from chickenpox. similar to the study of Poudel, Ram Chandra, et al. 2019. Because 54% of the infections were among school-aged children, the outbreak may have occurred. One of the reasons people do not visit health care institutions is due to sociocultural beliefs. This demonstrates the obvious need for health education in illness prevention and control. Similarly show the study of Poudel, R. C., Munikar, S., Acharya, B., Shrestha, G., & Thapa, K. (2019). Health education was provided to the community through the mobilization of ASHAs (Mitanins), health professionals, and community leaders. The cases were isolated until all of the lesions crusted, which helped to suppress the epidemic.

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## Conclusion :

A brief epidemiological assessment reveals that the chickenpox outbreak in Khairi was caused by a propagated source. The majority of cases (34%) had rashes with fever as their initial clinical presentation. From the descriptive analysis, we can hypothesize that the Index case possibly carried the infection to the marriage place from the hometown and further propagated among the individuals who lived with them in the home, schools, and village, most likely due to superstition, traditional healers, and poor ventilation. These findings highlighted the necessity of case-based chickenpox reporting and upgrading our surveillance system for early diagnosis, interventions, and control measures to avert a possible outbreak. Health-care practitioners, school authorities, and community members should be educated and made aware of the need of recognizing patients with mild instances.

## Recommendations

Since Chickenpox usually spreads by direct contact or through airborne droplets, a precaution in these regards is warranted. School Principal should improve the cleanliness of the school campus. All school teachers should be sensitized to immediately report suspected cases. Health education regarding washing hands and respiratory etiquette. Active case search to be continued for early detection of fresh cases if any, till 21 days. Encourage all reporting units to report all the cases to DSU IDSP/IHIP Portal.

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## Declaration

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee.

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