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Original Article

Microbiology Section

# An Outbreak of Varicella in Rural Area of Surat District, South Gujarat

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## ABSTRACT

**Introduction:** Chickenpox outbreaks are common in naive unvaccinated communities in India as compared to western world. The routine childhood immunisation in few countries has reduced the incidence of the disease and associated complications.

**Aim:** To report the outbreak of varicella which occurred in Pariyar village of Olpad, Surat district, Gujarat, India with confirmation of chickenpox cases by serological test.

**Materials and Methods:** The Department of Microbiology, Government Medical College, Surat, Gujarat was informed about the outbreak of fever with rash in Pariya village of Olpad, Surat district, Gujarat in the 3rd week of March 2017. The serum samples were collected from affected patients and were tested for the Varicella zoster Virus (VZV) IgM by Enzyme-Linked Immunosorbent Assay (ELISA). The VZV specific IgM and IgG antibodies were detected using commercially available kits (Demeditec diagnostics, GmbH, Germany) as per the manufacturer's instructions.

**Results:** After testing the blood samples received from 40 clinically suspected cases, VZV IgM antibodies were detected in 30 (75%) cases, and VZV IgG antibodies were detected in 38 (95%) cases. A total of 28 (70%) patients showed the presence of both VZV IgM and IgG antibodies.

**Conclusion:** There is a need to train the peripheral health care workers for early identification of highly contagious communicable diseases and introducing the varicella vaccine in the universal immunisation programme to prevent such outbreaks.


**Keywords:** Chickenpox, Epidemiology, Immunisation, Varicella zoster virus

## INTRODUCTION

Chickenpox or varicella is a highly contagious and communicable disease of childhood. It is caused by VZV, belonging to the family Herpesviridae. Human beings are the only known hosts of this virus [1]. It can be a life-threatening condition in adults and immunocompromised individuals, once they are exposed to this virus [2]. In Majority of the cases, the infection presents as a fever and exanthematous rash; but it can affect almost any organ of the body. The disease is usually self-limiting and provides lifelong immunity. The long term consequences include the development of herpes zoster which is due to reactivation of latent varicella infection [3]. The incubation period ranges between 7 and 23 days (mean- 2 weeks) [4]. The contagious period starts 1-2 days before the appearance of the exanthema and lasts for 5-7 days when the vesicles starts crusting [5]. The major route of transmission is airborne, viral sheds from nasopharyngeal secretion which forms aerosol or droplets. However, transmissions via direct contact with the blister fluid have also been reported [4]. The incidence of Varicella is different in different geographical area, as in temperate region the incidence of Varicella is 13-16 cases per 1000 people per year [6], and is highest in children aged 1-9 years. It has an increased incidence in children younger than five years as children attend child care centres. The overall case fatality rate in developed countries is 2-4 per 100,000 cases, with the risk of death being highest at the extremes of age [7]. In tropical regions virus affects mainly adolescents and young adults and the severity of disease is high which suggests that tropical countries may be at a higher risk of morbidity and mortality [8,9]. The disease preferably occurs during the cooler season, as in winter and spring [10]. Varicella is one of the leading causes of vaccine-preventable deaths in children [11]. Many countries such as Japan, Korea and the United States of America have included the varicella vaccine in the universal immunisation programme which has led to dramatic reduction in the incidence, its associated complications, hospitalisations, and fatality rate [11-13]. In some regions, Chickenpox had not been a notifiable disease till 2005, so the epidemiological data of the disease is very less. The incidence of varicella outbreak has been continued in the unvaccinated rural population as vaccination against varicella is not included in the universal immunisation programme in India [14-16]. The present study reports an outbreak of varicella in Pariyar village of Sandhiyer PHC, Olpad, Surat district, with confirmation of chickenpox cases by a serological test. The Pariyar village has approximately a population of about 2320 and 555 houses. The type of houses in the area was pakka (well built) and each house was occupied by 4-5 family members. Certain epidemiological factors like overcrowding, poor ventilation, and lower reduction status possibly promoted the spread of the virus this locality.

## MATERIALS AND METHODS

The present study was a cross-sectional study. The Department of Microbiology was informed about an outbreak of fever with rashes in Pariyar village, Olpad, Surat district, Gujarat, India, in the 3rd week of March 2017. Active surveillance of the affected localities was carried out in March 2017 by the Department of Microbiology. All these patients were examined for the presence of typical rash of varicella by a clinician from New Civil Hospital, Surat, Gujarat as they were a part of Rapid Response Team. A detailed history was taken and the line listing of cases was prepared. Clinical sign and symptoms defined by the Centres for Disease Control and Prevention (CDC) Atlanta, Georgia, USA, in the case definition of chickenpox was used for clinical diagnosis of cases [17]. Blood samples were collected from 40 representative cases of suspected chickenpox infection (In acute and recovery phase). Twenty blood samples from an asymptomatic healthy individual residing in the same community were collected who had never suffered from chickenpox in the past to see the VZV IgM and IgG antibodies. A confirmed case was defined as any case with clinical evidence suggestive of chickenpox along with laboratory confirmation of the disease either by serology or nucleic acid detection or by both [17]. The study was approved by the Institutional Ethics Committee

as per the national guidelines (Approval No. MCS/STU/ETHICS/Approval/34568/17). Sample collection was done after obtaining informed consent from adults and parents (in case of children). All age groups and both sex groups were included in the present study. Cases which showed the clinical sign and symptoms defined by the Centres for Disease CDC were included in the present study. The fever cases due to other aetiologies were excluded from the study. Samples were sent to the Department of Microbiology for serology testing. Samples were tested for IgM and IgG antibodies against chickenpox virus for confirmation of disease. Serum samples were stored at -20°C after the serological test.

### Serology

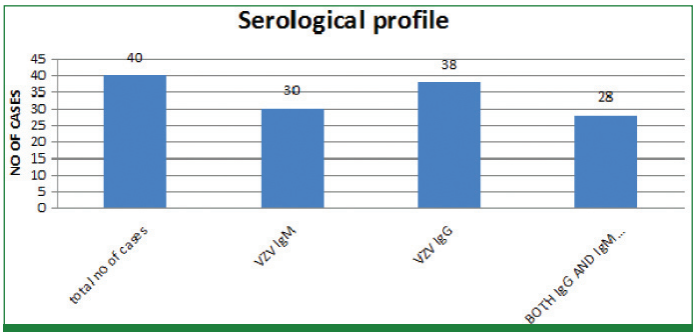
The VZV specific IgM and IgG antibodies were detected using commercially available ELISA kits (Demeditec diagnostics, GmbH, Germany) as per the manufacturer's instructions.

## RESULTS

A total of 40 suspected cases of varicella occurred in the present outbreak. Of these, 30 cases were confirmed by the serological test in the laboratory. The age of the patients ranged from 4 years to 45 years (mean age-12 years). The majority of the suspected cases were <10 years of age. Of the 30 laboratory confirmed cases,18 (60%) were males, and 12 (40%) were females. The most common clinical manifestations observed were rash (100%) and fever (97%). The rash was generalised in all of the cases, and the first site was the trunk in the majority of the patients. The typical presentation was vesicles followed by a maculopapular rash with the majority of the patients presenting with 50-200 lesions. There was no history of vaccination against VZV in an infected individual. All the sufferers recovered without any major complications.

### Serological Profile

On testing the blood samples received from 40 clinically suspected cases, VZV IgM antibodies could be detected in 30 (75%) cases, and VZV IgG antibodies were detected in 38 (95%) cases. A total of 28 (70%) patients showed the presence of both VZV IgM and IgG antibodies. Of the 20 healthy individual, VZV IgM antibodies were not detected and IgG antibodies could be detected in 12 (60%) subjects. All asymptomatic healthy controls were followed-up to see any development of clinical disease but no one had developed any sign or symptoms of disease [Table/Fig-1].




**[Table/Fig-1]:** The serological profile of affected active cases.

## DISSCUSSION

Varicella zoster Virus (VZV) is an extremely common infection worldwide. Its epidemiology is different from tropical to temperate climates [10]. More than 90% of adults are immune against VZV infection in temperate countries, but VZV seroprevalence cerate sare lower in tropical areas [18]. The majority of the population are sero converted in adolescence in temperate countries, while in tropical countries, sero conversion generally occurs in late adolescence and adulthood. VZV is generally considered as little more than a nuisance infection in children [10]. There are various epidemiological factors contributing to an outbreak of chickenpox. The outbreak of chickenpox occurs in winter, which is the usual time of occurrence. The present study suggests that at high ambient temperatures and humidity along with people in a naive community living in close proximity, leading to the rapid transmission of the virus from person to person and further spread of infection [19]. The outbreak follows a typical tree-like pattern, where one case acts as a source of infection to only patients had healed lesion with the duration of infection about 1-2 months. The other study by Singh MP et al., had shown a similar finding for raised IgG antibodies (95%) in patients with healed lesions [2]. Two patients showed only VZV IgM antibodies and absence of IgG antibodies along with an active exanthematous rash lesion for four days which was suggestive of an acute phase of illness. Of 20 healthy controls from the same area had shown 60% (12/20) IgG positivity which is also seen in Singh MP et al., study (31% IgG positivity) [2].

Indian Universal Immunisation Programme does not recommend vaccination against chickenpox but Indian Academy of Paediatrics (IAP) suggests that it can be given to adolescents who have not had Varicella in childhood. It can also be given to children attending day care centres, household contacts of immunocompromised children, and adults who are working in the institutional setup as school teachers, day-care centre workers, military personnel, health care professionals, etc., [20]. Studies have shown that the Varicella vaccination, when used as post-exposure prophylaxis in children within five days of exposure significantly reduces the chance of developing clinical Varicella infection. The effect is more pronounced if vaccine is given within three days of exposure, and prevents nearly all cases of moderate to severe Varicella [19]. In the present study, the screening and vaccination of Varicella IgG-negative individuals, once a primary case was identified, would have helped to curtail the outbreak.

## LIMITATION

In the present study, the molecular profile of varicella virus was not done. Further studies with molecular profile of varicella virus are recommended.

## CONCLUSION

There is a need to train the peripheral health care workers for early identification of highly contagious communicable diseases so that such outbreaks can be prevented. An introduction of varicella vaccine in the universal immunisation programme may prevent these types of outbreaks in naive communities and unvaccinated population. So policies should be prepared and cost benefit analysis should be carried out.

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