

## OUTBREAK OF CHICKENPOX IN A MILITARY CENTER IN NORTHERN PAKISTAN

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### ABSTRACT

**Objective:** To study the outbreak of chickenpox in a military training center in Northern Pakistan.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** Combined Military Hospital (CMH) Attock from 1st Nov 2007 to 30<sup>th</sup> Jan 2008.

**Material and Methods:** Patients with clinical suspicion of chickenpox during the outbreak were confirmed by laboratory tests including complement fixation test using commercial antigen of Virion/Serion of Germany and Immunoglobulin M for Varicella zoster virus by enzyme linked immunosorbent assay of Vircell, Spain. Moreover, direct immunofluorescence using BioRad kit was also done in patients with active lesions.

**Results:** A total of 102 cases occurred in the present outbreak. The age of the patients ranged from 16 to 35 years with a mean of 21.16 + 4.47 years. From a total of 102 patients, 60 (58.8%) were positive for antibodies against Varicella zoster virus by complement fixation test, 30 (29.4 %) were positive by ELISA and 12 (11.7%) were positive on Immunofluorescence testing. None of the admitted cases developed any complication and their hospital stay remained uneventful.

**Conclusion:** This outbreak of chickenpox in a military training center affected a considerable number of military recruits, led to a number of hospital admissions and had an adverse effect on training activities. There is a need to formulate a policy to offer vaccination against Varicella zoster virus to all unimmunized individuals before induction in the military to avoid unnecessary interruption in training and academic activities.

**Keywords:** Chickenpox, Outbreak, Varicella.

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### INTRODUCTION

Chickenpox is the manifestation of primary infection with Varicella zoster virus (VZV) and is one of the commonest communicable diseases worldwide<sup>1</sup>. It has a characteristic clinical presentation in the form of a vesicular rash in majority of cases. Although most cases recover spontaneously with time, few progress to serious consequences in adults, especially in immunosuppressed individuals<sup>2</sup>. Varicella is a highly contagious disease with an attack rate approaching >85% after exposure<sup>3</sup>. The virus only causes disease in humans<sup>4</sup> and exists as a single serotype<sup>5</sup>. Because of its single serotype an effective vaccine is present and is being used successfully worldwide with very promising results. During the infective stage of

the disease, viral shedding occurs from the nasopharynx in the form of droplets and aerosols and also from the skin lesions. The droplets and aerosols facilitate the spread of virus within the community. The incubation period of the disease is usually 14-16 days<sup>6</sup>. The contagious period starts 1-2 days before the appearance of the exanthem and lasts till all the vesicles have crusted, usually within 5-7 days<sup>7</sup>. Due to this the affected person spreads the disease before the clinical manifestations appear. Since the virus is contagious in nature and has a high attack rate, the disease is important especially in settings where the disease can spread easily and rapidly, leading to an outbreak and disruption of routine activities. These settings include schools, hostels, military camps and barracks where the disease can easily spread, especially in unvaccinated individuals. The aim of this research was to study the effect of outbreak of chickenpox on military recruits in a military centre in Pakistan.

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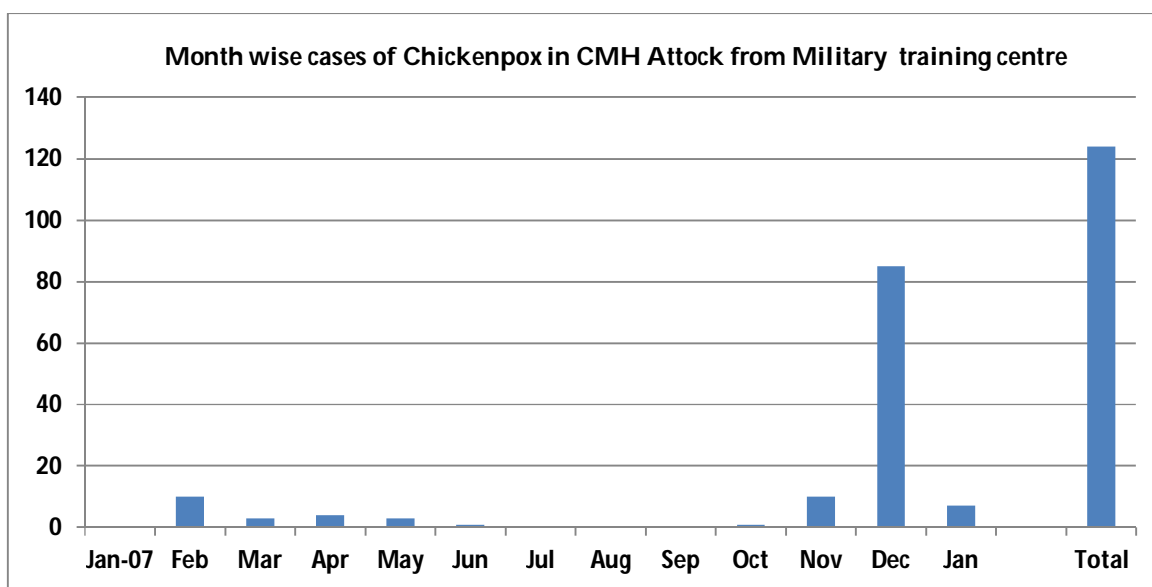
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**MATERIAL AND METHODS**

The study was conducted in Combined Military Hospital (CMH), Attock from 1<sup>st</sup> Dec 2007 to 30<sup>th</sup> Jan 2008. A total of 102 patients representing an acute illness along with diffuse papulo-vesicular rash and fever with an average hospital stay of eight to twelve days were included in the study<sup>8</sup>. The patients under study were young males from age 16–35 years, out of them majority were military recruits and a few held administrative positions. Consecutive non probability sampling technique was used for this cross sectional

was done and sheep cell control, antigen control and complement controls were used in each batch of tests. The formation of red cell button depicted the presence of VZV antibodies in serum being tested whereas the formation of a mat due to RBC hemolysis showed the absence of VZV antibodies. IgM ELISA of Vircell, Spain was also used to detect VZV antibodies for laboratory diagnosis in a number of cases. Along with each test batch of ELISA, positive and negative controls were run as internal controls according to manufacturer’s protocol. In patients with active lesions, scrapings from



**Figure-1: Showing seasonal prevalence of chickenpox with month wise distribution of cases.**

The above figures (fig-1) clearly show that occasional cases of chickenpox occur throughout the year and there is an upsurge of cases during the winter months which are characteristic of this disease.

study. The details of the patients were recorded in a proforma and informed consent was taken before phlebotomy 3ml of blood was collected in plain tubes using aseptic method. Serum was separated by centrifugation and stored at -50 degrees Celsius. The tests were performed in batches. Antibodies against Varicella virus were detected using complement fixation test (CFT) and Immunoglobulin M (IgM) by ELISA. In complement fixation test, antibodies against VZV were detected in micro wells using commercial VZV antigen of Virion/Serion of Germany, sheep red blood cells (RBCs) and guinea pig serum as complement. The titration

lesions were collected and direct immunofluorescence was done using commercial kit of BioRad for confirming diagnosis of chickenpox.

**Data Analysis**

Statistical analysis was performed using the SPSS version 17. Descriptive statistics were used to calculate variables. Mean was calculated for quantitative variables like age. Qualitative variable was measured as percentage for patients who were positive for antibodies against VZV by using CFT, ELISA and immunofluorescence respectively. Results are represented in the form of bar charts.

**RESULTS**

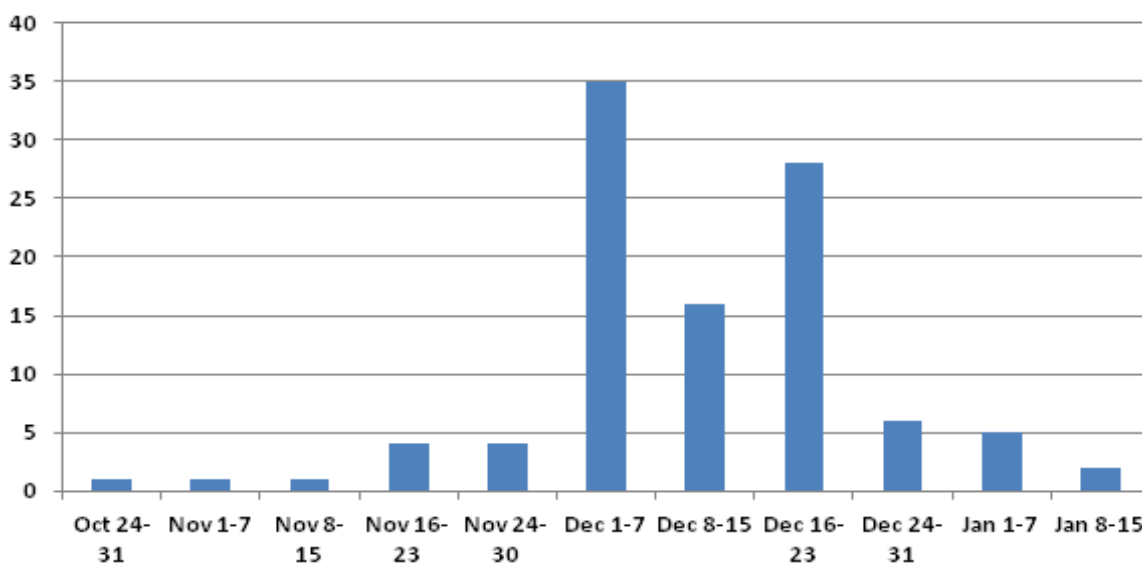
A total of 102 cases of chickenpox from a military training centre in Attock were admitted in CMH Attock during the outbreak from Nov 2007 and Jan 2008. The age of the patients ranged from 16 to 35 years with a mean of 21.16 + 4.47 years. 75 patients (73.5%) were young male recruits and 27 (26.5%) were administrative staff. From a total of 102 patients, 60 (58.8%) were positive for antibodies against VZV by CFT, 30 (29.4%) were positive by ELISA and 12 (11.7%) were positive on Immunofluorescence testing. None of the admitted cases developed any complication and their mean hospital stay was 11 days with standard deviation of 0.816. The obtained data was analyzed using SPSS version 17.

The month wise distribution of cases of chickenpox in CMH Attock in 2007 were

in tropical countries like Pakistan and India, the incidence of Varicella is higher in adults<sup>11</sup>. In both temperate and most tropical climates, the incidence of varicella shows pronounced seasonality, with peaks occurring in the cooler months during winter or spring<sup>12</sup>. In temperate climates, epidemics of Varicella have been reported to occur every 2-5 years. 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. The rate of hospital admission for all ages is 2-6 per 100,000 populations, with most admissions occurring in children<sup>13,14</sup>.

Since the introduction of widespread pediatric immunization in the United States in 1995, the incidence of varicella has declined significantly, approaching a decline of up to 90%. Mortality from varicella has also declined

**Cases of chickenpox week wise during the outbreak**



**Figure-2: Showing the number of cases per week during the outbreak of chickenpox.**

collected from previous records and the ongoing outbreak and are given in fig-1.

**DISCUSSION**

The incidence of Varicella in temperate climates is 13-16 cases per 1000 people per year<sup>9</sup>, and is highest in children aged 1-9 years old, although an increased incidence has been observed in children younger than 5 years due to attendance at child care centers<sup>10</sup>. However,

since the initiation of the US vaccination program, with mortality decreasing by approximately 66%<sup>15</sup>. Similarly in other developed countries successful vaccination against VZV is being done in general as well as selected population groups to prevent outbreaks.

The availability of safe and effective vaccines has renewed interest in the epidemiology of varicella worldwide. To date

published data on the epidemiology of varicella in Pakistan is very scarce. A study was conducted in Pakistan to determine the age-specific seroprevalence rate of varicella-zoster virus (VZV) between December 1997 and March 1998, on 1,509 healthy volunteers aged between 1 month and 30 years. Overall 41.8% (600/1,435) of those tested were found to be seropositive for VZV antibodies<sup>16</sup>. No difference was found in results obtained from the different cities. A higher seroprevalence was observed among women (45.2%) compared to men (39.6%). Seroprevalence rates increased with age and were 46.7% in the 16-20 year age group and 53.6% in those aged 21-30 years. As in other tropical countries, there is greater susceptibility to varicella among the adolescent and young adult population<sup>17</sup>. The results of this study suggest that these at-risk groups should be included in vaccination programs aimed at reducing the public health impact of Varicella.

In our study, the affected individuals were young military recruits undergoing rigorous military training. These were housed in barracks which favor the spread of diseases like VZV due to frequent close contact. The situation is worsened by the fact that few people have natural immunity against the disease and majority of the people are susceptible, leading to outbreaks. In such outbreaks, early identification of the agent causing the disease and timely preventive measures in the form of isolation, vaccination followed by treatment are of utmost importance to prevent the further spread of disease.

## CONCLUSION

This outbreak of chickenpox in a military training centre affected a considerable number of military recruits, lead to a number of hospital admissions and had an adverse affect on training activities. Chickenpox can be more serious in adults than in children as they are more likely to be admitted for consequences, such as pneumonia. Although the disease is more serious in adults, majority of the people

make a full uneventful recovery from the disease.

There is a need to formulate a policy to offer vaccination against VZV to all unimmunized individuals before induction in the military to avoid unnecessary interruption in training and academic activities.

## CONFLICT OF INTEREST

The authors of this study reported no conflict of interest.

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