Outbreak of Rubella Among Cadets in an Academy

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Abstract

Background: Rubella is traditionally considered a childhood disease, but has the potential to cause outbreaks in closed community of young adults. The present paper describes one such outbreak in a military training establishment.

Method: The cases of rubella outbreak were identified by clinical features (fever, rash and lymphadenopathy) and confirmed by detection of high titre of anti-rubella IgM antibodies by enzyme-linked immunosorbent assay. Initial serum samples were also tested for antibodies against measles, scrub typhus and dengue. Salient epidemiological features of the outbreak were studied.

Result: 163 cadets were admitted in the local military hospital within two months. The cases presented with fever, coryza, lymphadenopathy and maculopapular rash. 117 (71.78%) of the samples showed presence of anti-rubella IgM antibodies.

Conclusion: Rubella outbreaks in military communities have the potential to adversely affect military training/operations. The need for administration of vaccination against rubella in such population may be reviewed.

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Key Words : Rubella outbreak; Military academy

Introduction

Rubella or German measles has been described as an acute childhood infection mainly affecting children in the age group of 3-10 years in developing countries [1]. In the developed countries it tends to affect older children, adolescents and young adults [2]. Individuals older than 15 years account for 70 percent of rubella cases in developed countries. This change in epidemiological pattern has been attributed to widespread immunization campaigns [1]. This paper describes an outbreak of rubella among young adults in a military training establishment.

Material and Methods

A clinical case definition during an outbreak was established as any person reporting with fever, sore throat, cough, coryza, lymphadenopathy (mainly postauricular, suboccipital and cervical group), conjunctival suffusion and fine erythematous maculopapular rash initially appearing on face and neck and then spreading to the rest of the body, fading after 3-4 days and disappearing completely.

Case classification

- (i) *Suspect case:* Any case which was compatible with the clinical case definition.
- (ii) *Confirmed case:* Suspect cases which showed IgM antirubella antibodies in the serum.

All the serum samples were sent to the Department of Microbiology, Armed Forces Medical College in cold chain. Initial 45 samples were also serologically tested for measles,

scrub typhus, and dengue. All the samples were tested for IgM antibodies against rubella. The quantitative estimation of IgM class antibodies to rubella antigen was done using kit developed by Globe Diagnostics, Italy. Serum samples were also collected from ten apparently healthy cadets from each squadron to check for prevalence of subclinical infection. All pregnant ladies in the campus were also screened for rubella antibodies. Routine haematological and biochemical parameters and chest radiographs were done.

Epidemiological investigation on an epidemiological case sheet and line listing as per date of admission was done. The data included personal details, history of immunization, fever with rash, movements for camps/outdoor training etc. Active case finding was done among cadets for new cases. Persons meeting the clinical case definition criteria were admitted, kept under isolation, and discharged after seven days of occurrence of rash.

All measures were taken to prevent the infection spreading among pregnant women. These included immediate discharge of antenatal cases from the service hospital where cases of rubella were being admitted, closure of the antenatal out patient department, active surveillance among pregnant ladies in the campus for IgM antibodies against rubella, advice to avoid pregnancy and health education on congenital rubella syndrome.

Results

Between 18 Feb 2004 to 22 Mar 2004, 163 cases of rubella occurred among the officer cadets, of which 117 (71.78%) were confirmed cases. Five officers (including two medical officers and a nursing officer attending the cases) and nine

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ladies were also affected.

The frequency of occurrence of various signs and symptoms among the cadets was as follows: Fever (91.9 %), rash (93%), sore throat/ dry cough (84.4 %), predominantly cervical lymphadenopathy (73.8%), coryza (62.5%), conjunctivitis (62.5%), headache (35.2%), chills (27.3%), arthralgia (16.4%), hepatomegaly (2.3%) and splenomegaly in (0.8 %). The mean temperature at the time of admission was 99.97° F and the mean pulse rate was 82.66 beats/minute.

Skin rash was the commonest finding affecting 93% of the cadets. It was erythematous and maculopapular. The distribution of rash on the face was seen in 67.1%, face and trunk simultaneously in 18 % and trunk alone in 14% of those affected. The onset of rash occurred with fever and subsided within 3-4 days, leaving no residual marks or scars. The rash and post auricular/cervical lymphadenopathy are shown in Fig. 1 and Fig. 2 respectively. All cadets had complete recovery.

Ecological factors and Epidemiology: A total of 163 cases occurred among cadets having an attack rate of 9.05%. Cadets stay in individual cabins, which rules out overcrowding in the living quarter, however there is intensive mixing of cadets in the dining hall, auditorium, classes, sports and recreational activities. The cadets were also exposed to the civil population while on out pass to the city and travelling in crowded public transport. The cadets undergo frequent short periods of outdoor training in tents, which facilitates spread of airborne infection. Following the outbreak amongst cadets, few cases occurred among trained soldiers, officers and families.

Time distribution: The index cases reported to hospital on 18th Feb 2004 with the first peak around 20th Feb 2004. The date wise admission of cadets is shown in Fig. 3. The graph

Fig. 1 : Maculopapular rash on face

demonstrates a propagated epidemic with multiple peaks indicating transmission of infection to successive clusters of cadets. The interval between the peaks is less than the incubation period of rubella (14-17 days), which implies that cases were infectious during the incubation period.

Laboratory findings: A total of 117 suspect cases showed presence of IgM antibodies against rubella indicating recent infection. Out of the 150 randomly selected asymptomatic cadets (10 from each squadron) whose samples were tested for IgM antibodies, only 10 (6.66%) showed presence of IgM antibodies against rubella implying that the rate of subclinical infection was below 7%. The initial 45 samples were negative for antibodies against measles, dengue, and scrub typhus and further samples were not tested for these viral/rickettsial agents as the aetiology of the outbreak being due to rubella was established beyond reasonable doubt. Routine haematological parameters including platelet counts were normal in all cases. All the cases made uneventful recovery. Of the 15 antenatal cases including their spouses who were tested for rubella serology, one antenatal case and two spouses of other pregnant women were positive for IgM antibodies against rubella. However, these two women themselves were negative for rubella antibodies. In all these cases, the wives were in third trimester and they had full term normal deliveries with newborns free from any signs of CRS.

Discussion

Rubella virus belonging to Togaviridae family, is a RNA virus which enters the body by inhalation and

Fig. 2 : Post auricular and cervical lymphadenopathy

Fig. 3 : Time distribution of rubella cases among officer cadets

multiplies asymptotically in the upper respiratory tract. It spreads via local lymph nodes to the blood stream. It is highly transmissible and spreads readily within close contacts [3,4]. Rubella is a mild febrile viral illness, which is endemic worldwide. The episode of illness is short lasting, with rare complication rate and active infection usually renders lifelong immunity. Clinical diagnosis of rubella is unreliable and laboratory confirmation essential [3,4].

In mid-sixties a pandemic occurred in United States and Europe affecting 12.5 million people [5]. In 1990's outbreaks of rubella in United States have been documented in workplace settings, institutions, and communities, where adolescents and young adults congregate and primarily sustained by persons, who have not been included in vaccine programs [4].

The outbreak highlights that perhaps rubella in our country may not be predominantly a childhood disease and there may be an age shift towards young adults. Acute infection in young women during pregnancy could result in CRS. Should we include, as an interim measure, rubella vaccination among school girls as practised in UK [3] before 1996? Secondly, do we introduce rubella vaccine in the armed forces particularly in training centres housing susceptible young adults? Rubella has been documented to occur in military training establishments around the world [4-6]. Rubella vaccine is given in the armed forces of United States and Singapore at entry [6]. The British army does not give rubella vaccine to its troops and had an outbreak amongst its troops stationed in Bosnia in 1996 [7]. The French army has not included rubella in its immunization schedule, and has perennial outbreaks among its military population suggesting a transfer of the reservoir of wild virus towards a non-immune population of young adults, as a result of rubella immunization confined to early childhood [8]. Buisson et al [8], predict that this phenomenon among the French army may disappear in coming decades, when the new vaccine schedule incorporating MMR for children in age group 11-13 years will be implemented in France. Lim et al [9], in their study revealed a low susceptibility of 2.9% among the recruits in Singapore, implying that routine immunization of recruits may no longer be indicated in their military. On the other hand, a serosurvey by Kelley et al [10], among US Army recruits found a higher susceptibility rate of 17.5%. Blouse et al [11], reported figures of 17.3% among US Air Force trainees. Duclos et al [12], reported 10.8% susceptibility to rubella among Canadian military recruits. Jirous and Machula [13], have reported increasing incidence of rubella in the Czech Army. Ziebold et al [14], have reported an outbreak of rubella

aboard a German ship having 12% susceptible sailors prior to the outbreak. The short review indicates that among militaries of different countries susceptibility varies, so does the vaccination policy. Outbreaks are common in absence of vaccination policy.

We need to deliberate about need for administering rubella vaccine on enrolment. Vaccination strategy should include proper surveillance, good microbiological support and cost benefit studies.

Conflicts of Interest

None identified

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