

An Outbreak of Rubella in a Hilly District of Kangra-Chamba, Himachal Pradesh, India, 2006

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ABSTRACT

Objective. We investigated the outbreak as a suspected outbreak of measles with the objectives of confirming diagnosis, estimating the magnitude of outbreak and formulating recommendations for control and prevention. **Methods.** We defined a case of the rubella as occurrence of fever with rash in any resident of these three villages between 20th October to 9th December, 2006. We line listed the cases and collected information on age, sex, residence, date of onset, symptoms, signs, treatment history, traveling history, vaccination status and pregnancy status. We described the outbreak by time, place and person characteristics. Sera of a sample of case patients were tested for IgM antibodies to measles and later rubella viruses. **Results.** We identified 61 cases in three villages - 39 cases in Hattli, 17 in Thulel and 5 in Dramman. The overall attack rate (AR) was 8.7%. Sex specific AR for males was 10% and females 7.4%. All case patients were less than 20 years of age and the attack rate was highest in the age group 11-20 years (median age 12 years). The index case was traced in Hattli Bengali slum and occurred on 20th October 2006 where majorities (41%) of the cases were reported. No pregnant woman was found to be affected. The number of cases peaked on 19th November and the last case was reported on 9th December 2006. Of 61 case-patients, 50 (82%) were immunized against measles while proportions of children vaccinated for measles were 96% (672/700) and none of them were immunized against rubella (including two (3%) who had MMR immunization privately). Out of six blood samples tested, all tested negative for measles IgM antibodies but four were positive for IgM antibodies to rubella. Only 36% (22/61) of the cases took the treatment from modern system of medicine. **Conclusion.** An outbreak of rubella was confirmed and was possibly due to the frequent traveling of Bengali colony patients to other areas for selling the food items. We advised the local health authorities to provide MMR vaccination to the unexposed and energetic IEC in three affected and neighboring villages. [*Indian J Pediatr* 2009; 76 (7) : 717-723] E-mail: drsuredernikhil@yahoo.com, drnikhilsurender@gmail.com

Key words: Rubella; outbreak; India

Rubella or German measles was considered a mild and benign viral disease of childhood until 1941 when Norman Gregg, an ophthalmologist reported an epidemic of congenital cataracts associated with other congenital defects in children born to the mothers who had rubella during their pregnancies.^{1,2} It usually presents as a mild febrile rash illness in adults and children; however, 20%—50% of infected persons are asymptomatic.³ Rubella can have severe adverse effects on the fetuses of pregnant women who contract the

disease during the first trimester of pregnancy, causing a wide range of congenital defects known as congenital rubella syndrome (CRS).⁴ As per the World Health Organization (WHO) estimate worldwide more than 100,000 children per year are born with CRS⁵. WHO established the Measles and Rubella Laboratory Network (LabNet) in 2003 to promote case identification and confirmation. This report provides an update on the development of LabNet during January 2004-June 2005 and describes the geographic distribution of measles and rubella virus genotypes as of June 2005.⁶ Special surveillance investigations in developing countries in Africa, the Americas, Asia, Eastern Europe and the Eastern Mediterranean have documented incidence rates of CRS ranging from 0.4 to 4.3 per 1 000 live births.^{7,8,9,10}

Rubella outbreaks are world wide in distribution and tend to occur in epidemics, in non-immunized

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[DOI-10.1007/s12098-009-0124-z]

[Received May 17, 2008; Accepted October 08, 2008]

populations; every 6 to 8 years.¹¹ The goal of the rubella vaccination program is to prevent the consequences of infection during a future pregnancy.¹² Many countries do not have rubella vaccination programs or have only recently implemented such programs, and many adults throughout the world remain susceptible. In 1996, the World Health Organization (WHO) estimated that 36% of member countries offered routine rubella vaccination.¹¹ In 1999, WHO estimated that 52% of countries offered routine rubella vaccination; in the Region of the Americas, 89% of countries used rubella vaccine.¹² WHO also has summarized current global vaccination policies for countries throughout the world.¹³ Hospital-based rubella outbreaks have been reported from industrialized countries.^{14, 15}

Studies in India indicate that approximately 40% of the women in child bearing age are susceptible to rubella.¹⁶ Although a safe vaccine RA 27/3 is available since 1979, it remains a leading cause of childhood preventable death and disability.¹⁷ In the revised vaccination strategy, the priority is to immunize first to women of the child bearing age and then interrupt the transmission by vaccinating the children from 1 to 14 years of the age by combined measles-mumps-rubella vaccines (MMR) by reaching as many as risk population as possible.¹⁸

Persons are generally presumed immune to rubella if they have documentation of vaccination with >1 dose of measles, mumps, rubella (MMR) vaccine or other live rubella containing vaccine administered on or after the first birthday or have laboratory evidence of immunity.¹⁹ The presence of rubella specific IgG in an unvaccinated population is a long term marker of previous rubella infection.²⁰ Nearly 50% of rubella infections are subclinical even after vertical infection in a community in which health is being monitored but the detection of IgM antibodies in early pregnancy is an important tool to identify active infection and to provide obstetric management to avoid the risk of congenital transmission of infection.²¹ The antibodies persist life long and said to protect the individual from rubella infection.^{22, 23} In India, such an outbreak was reported from the St John's Medical College and Hospital, Bangalore, in 1990²⁴ and another occurred in 1996 among medical and nursing students and staff at the Christian Medical College, Vellore, (Tamil Nadu).²⁵ In India, rubella vaccine has not yet been incorporated into the National immunization programme. The lack of reliable surveillance data and understanding of local rubella epidemiology makes it difficult to fully appreciate the public health burden in India and to organize targeted rubella morbidity and mortality reduction strategy.

In Indian states like Himachal Pradesh that have achieved the high coverage of the measles vaccine (over 90%)^{26, 27} but rubella vaccination has not been incorporated under UIP. Hence, an ideal opportunity exists to include rubella under national control

programme so as to prevent congenital rubella syndrome (CRS) in the country. We investigated the outbreak with the objectives of (1) Confirming the existence of the outbreak; (2) Assessing the severity of outbreak; (3) Confirming the diagnosis; (4) Characterizing the population at risk; (5) Initiating appropriate measures to reduce morbidity and mortality and (6) Formulating recommendations on the basis of the results of present outbreak investigation.

MATERIALS AND METHODS

On 5th November, 2006, a community leader from Shahpur block reported the occurrence of cases of fever and rash with enlarged neck glands in the panchayat Dramman (Kangra) and two bordering panchayats; Thulel and Hattli (Chamba district) of sub centre Thulel under primary health centre Sinhuta of Samote block, District Chamba, Himachal Pradesh. Primary Health Centre Sinhuta has six sub centers, namely, Jolma; Thulel; Dhurdala; Chhalarra; Garnota and Gola. From Shahpur block (Kangra) to sub centre Thulel, it is 4 kms away and from Samote block to Thulel, it is 23 kms and the sub center is distanced 140 kms away to District Head quarter, Chamba. The road is metalled and easily accessible to the public and beneficiaries but the interior is zig-zag and most of the way it is on foot surveying. The forenamed three affected panchayats have the population of 3498 with 27 small villages under sub centre Thulel. But the affected three villages of three panchayats Dramman, Thulel and Hattli have the total population break up as 62 with 13 houses; 519 with 72 houses and 531 with 93 houses respectively. The villages-Dramman and Bengali Colony slum are located in the semi hill area while Thulel and rest part of Hattli village are located at hill area of the district. The rural slum -Bengali colony with a population of 98 with 19 muddy houses also lies in Hattli Panchayat. The rest of 24 villages under sub centre Thulel were left unsurveyed and uninvestigated, as they were not affected.

We lodged the Firsthand Information Report (FIR) to the district health authorities as well as to National Institute of Epidemiology by fax/e-mail and telephonically. However, this investigation was conducted in the context of public health response to an outbreak and therefore, ethical committee review was not indicated. We had written informed consent of the mothers of children in local language for quantitative as well as qualitative interview schedule, physical examination and also for laboratory samples. We used coding for the participants to maintain confidentiality while analysis. After the completion of the interview, each individual was given health education and fact sheet about the risk factors related to rubella. We analyzed the data by MS-excel sheet and using Epi info version 3.3.2.

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Outbreak was ongoing when the investigation was started on 7th November, 2006. An epidemiologist-in-training from National Institute of Epidemiology, Chennai along with the rapid response team from the local health system investigated the outbreak on 8th November, 2006. A review of the number of cases of febrile rash reported under sub centre Thulel of Samote block of Chamba district, a comparison with retrospective data was made from the records of health care facilities. We noticed that there was increase in number of cases exceeding 10% of the cases from the previous years. This made us to investigate further, as there was no population migration and no change in surveillance practices.

We defined a case of measles as the occurrence of a febrile rash with/without coryza or conjunctivitis in residents of the Dramman village of Shahpur block (Kangra) and bordering villages of Thulel and Hattli/Bengali colony (BC) since 14th October to 9th December, 2006. We initiated active case search by visiting house to house to identify cases that meet the case definition in affected aforementioned three villages with the population of 1112. For this exercise, we constituted two teams of health workers. In each team, there were two health workers; one male and second female supervised by one male health supervisor. The mother of the every case patient or the next elder available member of the family was interviewed with the semi structured questionnaire in Hindi language for 20 minutes. The whole exercise was supervised by two senior medical officers.

We explained the purpose and processing of the samples and then, had 6 randomly collected samples of blood, 6 samples of nasopharyngeal swabs for virus isolation and genotyping of the strain circulating in Himachal Pradesh and similar number of samples of urine for culture/sensitivity at random from afflicted population and from different places under the written informed consent; using sterile equipment, separated the serum and transported the specimen to National Institute of Virology (NIV), Pune in cold chain. The laboratory tested specimens for IgM antibodies using ELISA. The samples were taken from those who were willing while the reluctant/refusing populations were dropped. The cases meeting the case definition from the line listing were abstracted and described in terms of person, place and time characteristics. We also collected information about (age, sex, symptomatology and date of onset of illness, treatment taken like modern medicine/traditional treatment-beliefs and barriers), travel history; any outsiders/foreigner visiting the place; immunization status of case patients and susceptible population, assessment of cold chain system right from the district, block, primary health centre, sub centre to the beneficiaries.

We drew map of the villages by location of

households to show the distribution of the cases by residence. We calculated the attack rate of cases by age group, sex groups using population data obtained from the block/primary health centre/sub centre health authorities. We examined the dynamic of the outbreak through the construction of an epidemic curve. We reviewed the use of vitamin A for case management during the outbreak and made the action plan with local authorities to suitably manage the cases.

RESULTS

A review of the number of cases of febrile rash reported ten years ago under sub centre Thulel of Samote block of Chamba district were 16/1892 (0.85%); a comparison with retrospective data was made. We noticed that there was increase in number of cases exceeding 10% of the cases from the previous years exceeding two standard deviations, thereby suggesting an outbreak. As there was no population migration and no change in surveillance practices, it signalled the need to investigate the patients by visiting the affected villages. A measles outbreak was reported in the area nine to ten years ago. The severity of the symptoms of the outbreak was less among the younger cases and more towards the older ones. The history of the fever was 61/61 (100%) in all case patients while 59/61 (96.7%) cases have maculopapular rash; 60/61(98.3%) cases possess conjunctivitis; 16/61 (32.7%) cases have the cough and 07/61 (11.4%) cases have lymphadenopathy; while 07/61 (11.4%, Table 1) cases suffer from arthralgia. No case patient has any complications in form of diarrhea, encephalitis, pneumonia, purpuric spots or otitis media *etc.*

All the samples (6/6) were negative for IgM antibodies for measles but 4/6 were IgM positive for rubella virus. Six samples of nasopharyngeal swabs for virus isolation and equal number of urine samples were destroyed while in transportation and mismanagement in packing and others for want of logistics' support and hence, no result was available for them.

TABLE 1. Symptomatology of Rubella cases (n=61) in village Dramman-Shahpur, (Kangra) and bordering Thulel and Hattli villages of Chamba district, Himachal Pradesh, India, 2006

Signs & Symptoms	Number of cases	Percentage
Fever	61	100
Rash	59	96.7
Conjunctivitis	60	98.3
Cough	16	32.7
Lymphadenopathy	07	11.4
Arthralgia	07	11.4
Encephalitis	00	00
Loose motions	00	00
Pneumonia	00	00

We identified a total of sixty one case patients from a study population of 3498. From the Dramman village 5 cases (5/37; 13.50%) of district Kangra, with 17 cases (17/334; 5.10%) bordering villages of Thulel; and Hattli/Bengali Colony (39 cases (39/329; 11.9%) of Chamba district. The overall attack rate is 61/700 (8.71%, Table 2). The attack rate was maximum in the age group of 11-20 years as 25/90 (28%); followed by 3/15 (20%), and 13/101 (13%) in the Bengali Colony (Hattli village); villages Dramman and Thulel respectively. The sex-specific attack rate was 33/326 (10%) in males and 28/374 (7.4%) of the females. Median age of the case patients is 12 years and the range is 1 year to 20 years. There were no

complications nor deaths reported on account of rubella.

Under primary health centre Sinhuta, there were six sub centres and the total numbers of the pregnant ladies at that given period were seventeen (17) but in one of the sub centres named as Chhalarra; there was one still birth delivered in the month of March, 2007. But under affected sub centre Thulel, there were three pregnant ladies in Thulel village but nil in villages Hattli and Dramman at the time of investigation of outbreak and no pregnant lady were affected by rubella in the outbreak. Of 61 case-patients, 50 (82%) were immunized against measles while proportions of children vaccinated for measles were 96% (672/700) and none of them were immunized against rubella (including two (3%) who had MMR immunization privately).

TABLE 2. Age and sex specific attack rates of Rubella cases (n=61) in village Dramman-Shahpur, (Kangra) and bordering Thulel and Hattli villages of Chamba district, Himachal Pradesh, India, 2006

Name of village	Age group	Cases/Total	Attack Rate (%)
Dramman	< 5 years	00/12	00
	5-10 years	02/10	20
	11-20 years	03/15	20
Thulel	<5 years	00/189	00
	5-10 years	04/44	09
	11-20 years	13/101	13
Hattli Bengali Colony	<5 years	03/169	02
	5-10 years	11/70	16
	11-20 years	25/90	28
Total	Up to 20 years	61/700	8.71
Sex	Male	33/326	10
	Female	28/374	7.4

The spot map suggests the sporadic distribution of the cases with maximum concentration of the cases 39/329 (11.9%) in Hattli Bengali colony where four houses out of nineteen houses had > two patients (Fig. 1). The index case identified in the Bengali colony (a travelling community) was reported on 20th October, 2006. The outbreak started in Hattli/Bengali Colony and nearby Dramman village and then spread further to Thulel and Hattli villages, owing to the frequent travelling of the Bengali community for selling their edible commodities in those villages. The epidemic curve suggested that there were number of generations of cases with a propagated outbreak peaking around 19th November, 2006. The number of cases declined during first week of December, 2006. (Fig. 2)

Nil number of cases were treated with vitamin A

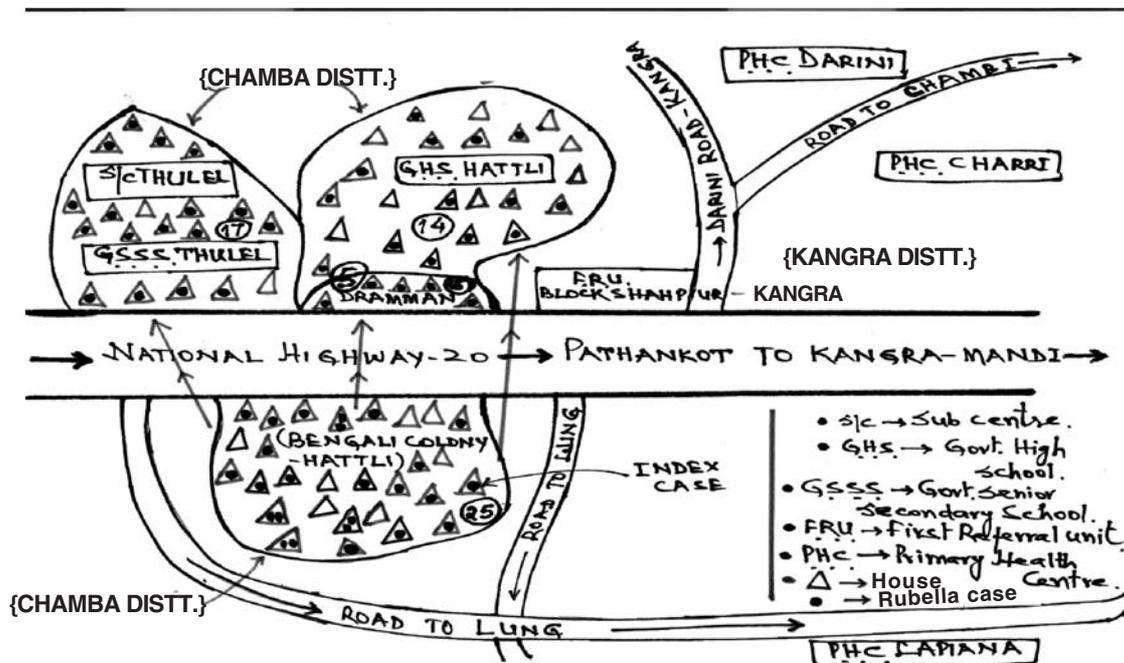


Fig. 1. Spot map of Rubella cases (n=61) in village Dramman-Shahpur, (Kangra) and bordering Thulel and Hattli villages of Chamba district, Himachal Pradesh, India, 2006.

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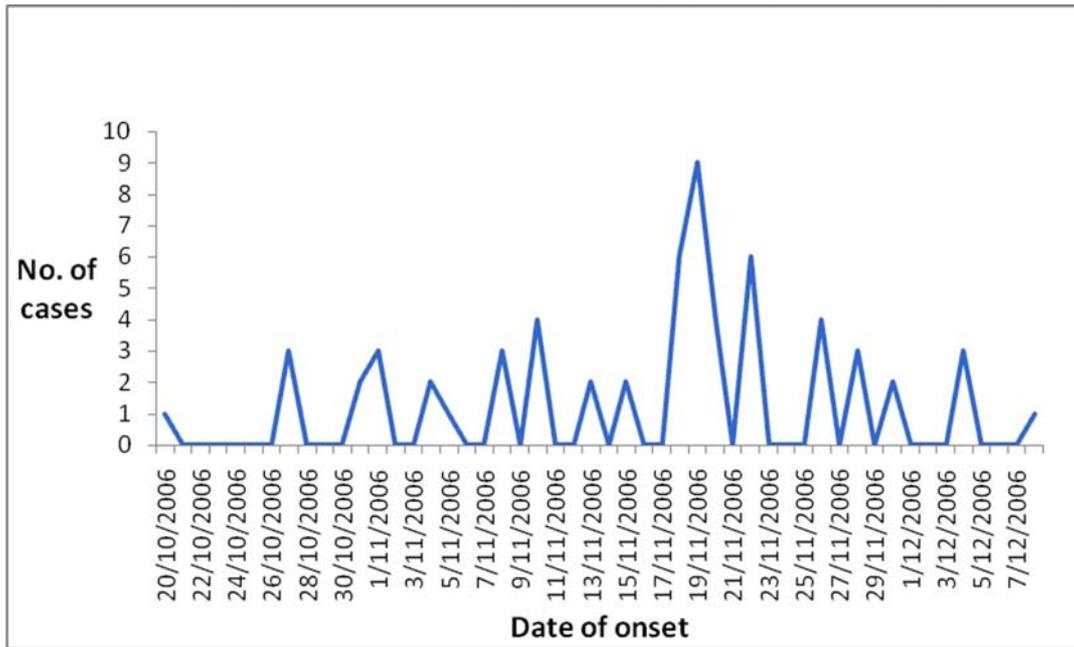


Fig. 2. Epidemic curve of Rubella cases (n=61) by date of rash in village Dramman-Shahpur, (Kangra) and bordering Thulel and Hattli villages of Chamba district, Himachal Pradesh, India, 2006.(Line diagram).

supplementation as there was no supply of the vitamin A to the health facility for the last over six months. The case patients took the treatment from the nearby first referral unit at Shahpur followed by, at Dr. Rajinder Prasad govt. medical college hospital, Dharamshala while only a few cases were treated at the primary health centre, Sinhuta/ sub centre Thulel but the supportive treatment and Information, Education and communication (IEC) were given from the sub centre and none of the villages' children who suffered had the rubella vaccination done for them except the two having Measles Mumps and Rubella (MMR) vaccination of their own privately.

21% (13/61) of the cases went for the traditional treatment of *Vannan bushes* (medicinal herbal plant) movements for the nearby local chelas/faith healers and

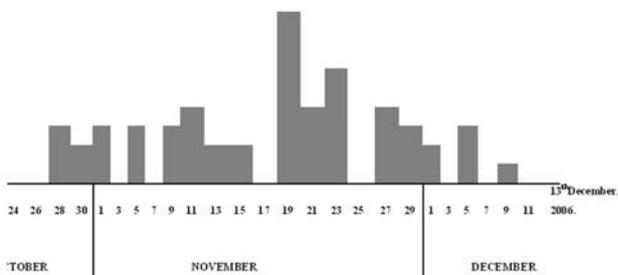


Fig. 2a. Epidemic curve of Rubella cases (n=61) by date of rash in village Dramman-Shahpur, (Kangra) and bordering Thulel and Hattli villages of Chamba district, Himachal Pradesh, India, 2006. (Histogram)

diet rich in *seul*, (A herbal plant with small granules, thought to be hot in nature by the local community members and they are supposed to facilitate the eruption of measles; These granules are also roasted for eating as well as smoked fumes are placed underneath the cot of the ailing patients) more so in Bengali slum area while 36% (22/61) had their treatment of choice to the modern system of medicine. Still majorities of the case patients, *i.e.*, 43% (26/61) believed the treatment in both ways; traditional conservative one first and then later on switched onto the modern one.

DISCUSSION

The outbreak of rubella struck the village of Dramman-Shahpur block (Kangra), Thulel and Hattli panchayats under sub centre Thulel of Samote block of district Chamba, Himachal Pradesh in the 3rd week of October, 2006 to 2nd week of December, 2006. It was reported by a local community leader and our existing surveillance system failed to detect it. Initially, we investigated this propagated outbreak on the suspicion of measles. However, the serology proved IgM negative for measles; it confirmed four out six samples IgM positive for rubella viruses. Symptoms frequency also supported the laboratory diagnosis. Although the cases in the outbreak were centralized in the rural slum of the Bengali colony and belonged to the lower socio-economic strata, yet the duration of illness was 7-10 days and severity of the symptoms was mild. All the cases in Hattli Bengali colony belonged to the older age

group (11-20 years), suggesting an obvious shift to the higher age group and the more males were afflicted. There were neither complications nor any case fatality. There was no involvement of the pregnant lady in the outbreak. The health workers of the area provided the supportive therapy to the case patients. The outbreak ceased in the 2nd week of December, 2006.

The index case identified in the Bengali colony of the Hattli village was reported on 26th Oct., 2006. The outbreak started in Hattli/Bengali rural slum and spread to the Dramman village and then to other places. Slums are high-risk areas leading to a high rate of disease transmission.²⁸ There were 19 one roomed huts in the colony with a population of 98 persons in / Bengali colony rural slum (Hattli village). There were four houses in which more than two persons were found to be rubella afflicted.

It is critical to note that no supplementary immunization activities like MMR during the outbreak were done, nor the vitamin A supplementation was instituted due to the non availability of the vitamin A in the head quarter for the last over six months. At present, there was lack of trained persons in specimen collection and transportation. Logistics for specimen collection is poorly available.

Traditional beliefs and barriers about rubella/measles do not foster healthy behaviors in the population like the intake of the medicines suppresses the disease; the affected children are to be kept huddled in the houses only and shown to the *local ojhas* for the treatment, esp., in cases of Bengali colony and the diet intake should be reduced to the minimum and VANNAN bushes movement on the patient's body with *Seul rich diet* as part of help seeking behavior before or with modern medicines later on, forms the mainstay of the treatment. That is why, no patient has ever reported to sub centre Thulel and the sensitivity of the health facility is nil and so is weakness of the existing surveillance system.

CONCLUSION

An outbreak of rubella was confirmed clinically, epidemiologically and serologically. No supplementary /ring immunization/MMR to the susceptible and vitamin A administration were provided in the affected cases of the areas, especially slum areas, Surveillance system in place is weak; Medical human resource available was untrained with inadequate logistics support and supply, Traditional beliefs and barriers form the mainstay of the treatment part.

RECOMMENDATIONS

- On the basis of investigation we proposed a

number of recommendations:

- Vaccinate MMR to the susceptible and administer vitamin A to the cases;
- Strengthen the existing surveillance system. Include rubella for surveillance under Integrated Disease Surveillance Programme (IDSP) and also include screening, surveillance and evaluation of children and ante and post natal mother;
- Identify outreach strategies to cover slum and remote villages;
- Ensure availability of MMR vaccines and other logistics for specimen collection and transportation;
- Ensure IEC activities aggressively at all the fronts, especially for pregnant women and the susceptible.

Acknowledgements

We gratefully acknowledge the cooperation we received in the investigation of this outbreak from the patients and their families and numerous individuals in Block Head quarters of Shahpur (Kangra) and Samote (Chamba), Health Department, Kangra at Dharamshala, Himachal Pradesh and Laboratory support from National Institute of Virology, Pune and guidory support and supervision from National Institute of Epidemiology, Chennai, India.

Contributions: Outbreak investigations and manuscript writing by Surender N Gupta, Data compilation and analysis by Naveen N Gupta.

Conflict of Interest: None

Role of Funding Source: None

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