Modified measles versus rubella versus atypical measles: One and same thing

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Abstract

Introduction: In outbreak settings, more than one virus may be infecting the given population. In twin or triple outbreak of measles, German measles (rubella), and varicella in highly immunized hilly areas, maximal number of the case patients in all the hilly villages belonged to the older age group. It suggested an obvious shift to the higher age group, warranting second dose opportunity in such case scenario. The clinical presentations of viral diseases are too similar to differentiate. The aim is to clearly categorize the case patients of modified measles, rubella, and atypical measles in outbreak settings. Results: Four outbreaks are listed. In the first one, sixty case patients were identified from 1026 people in 5 villages. Of these, 41 were diagnosed by clinically, 8 were laboratory confirmed as measles and 11 were epidemiologically linked German measles case patients. Seventy percent of the cases were vaccinated for measles. In second case, we identified 29/35 measles and 6/35 were confirmed as epidemiologically linked unvaccinated chickenpox case patients. In third one, we identified 116 cases in eight villages (112/116 clinically and 04/116 laboratory confirmed). Majority of cases were immunized against measles, but only minor cases for rubella. In fourth case, we identified 505 case patients from mixed outbreaks of varicella, measles and rubella (30/505 clinically, 467/505 epidemiologically linked and 8/505 laboratory confirmed case patients from a study population of 3280). In all the four outbreaks, prima facie, the clinical presentations of both rubella and modified measles were difficult to differentiate. Discussion: On the basis of outbreak investigation and analytical inference, it has been observed that the symptomatology of modified measles and laboratory confirmed rubella case patients/epidemiologically linked cases are so similar placed that many a time, it becomes much difficult to line list the cases in one section of modified measles or rubella or atypical cases. Conclusion: Similarities of morphological symptoms between modified measles and rubella is the point of challenge and it causes debate between pediatrician and field epidemiologist to differentiate and classify them.

Keywords: Atypical measles, Kangra, Northern Himachal, modified measles, rubella, twin outbreak, triple infection

Introduction

Measles, the vaccine preventable disease, still issues the death warrant for low income group countries with weak infrastructure and 95% of the death is reported from these countries. In India, measles mortality has been estimated to be 80,000 which contribute to nearly 4% for under five children while rubella is a mild febrile rash illness in children and adolescence. WHO and UNICEF adopted a three-phase strategy for global measles elimination. The three phases of the strategy are (1) Measles control, (2) outbreak prevention, and (3) measles elimination. The three phases of the strategy are (a) Measles control through reaching coverage higher than 80%, (b) outbreak prevention, the second phase, is based upon strengthening surveillance to detect and investigate outbreaks; (c) measles elimination strategy includes three objectives (1) A routine immunization coverage of exceeding 90% (2) a second opportunity for measles vaccination to be administered through the routine system or through supplementary immunization activities and (3) enhanced surveillance and case management.

Measles immunization coverage in Himachal Pradesh ranges from 72% to 89% to 86% which suggests that there is gradual rise over the years while in India it satisfactorily increased from 42% to 51% to 59%. As the coverage increases, interepidemic interval increases as well as focus shifts towards older age groups as observed in Thailand and Kangra. This is on account of

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high measles immunization (>95%) in Himachal Pradesh the incidence of the measles cases have gone down from 1.9 to 1.1 to 0.8/million from 2001–2003. But on account of extensive vaccination of measles and MMR in early childhood, morbidity and mortality have undergone a tremendous transformation and so is disease pattern of this vaccine preventable disease.

Cyclic increase in incidence of measles and rubella has been recorded every third to fifth year till the launch of Universal Immunization Programme (UIP). UIP was launched in 1985 after successful eradication of small pox and with the result; measles was added for the first time in it. During 1987 about 250,000 cases were reported, whereas after implementation of universal immunization programme, the number of reported cases came down sharply to 39,000 during the year 1999. The progress made under the UIP was impressive (Minimum 80% coverage of infants). Nearly 22 million infants are reported to be receiving full courses of immunization annually since then and 43.5% are fully immunized children. Diseases reappear when immunization coverage drops. But in the country, Delhi state has higher vaccine coverage since it has taken the lead and initiative of the two dose schedule of measles and rubella, mumps, rubella (MMR) at 9 months and at 15 months, respectively. Goa, Maharashtra, and Tamil Nadu reached 84–88% coverage. Six states, Andhra Pradesh, Chhatisgarh, Delhi, Gujarat, Punjab, and Madhya Pradesh achieved coverage of more than 70%. The effective vaccination has reduced the incidence in children and the adolescent groups are affected. Higher vaccination coverage has led to widening of the outbreak intervals and in the outbreak settings, more and more of case patients of measles, rubella, and chickenpox are now being examined in higher age groups as have been observed in the outbreak patterns on Kangra district of northern Himachal of India. More than one viruses have also been recorded in the one outbreak, be it measles and rubella; measles, rubella, and varicella/herpes zoster. Clinician in chamber and field epidemiologist contests their claim differently for these viral diseases depending upon the morphological similarities of symptomatology and their fleeting nature within 1 to 2 days. This sparks the strong point of debate. The aim is to categorize clearly the case patients of modified measles, rubella and atypical measles in outbreak settings. Measles, modified measles, rubella, and atypical measles are case defined. Measles is defined clinically by WHO criteria as the occurrence of a febrile rash with or without cough, coryza, and conjunctivitis while modified measles means measles in individuals with vaccine-induced (but limited) immunity. Rubella means a short febrile rash while atypical measles has the characteristic erythematous, maculopapular rash which it progresses frequently to vesicular, petechial, or purpuric lesions. A debate paper of modified measles versus rubella versus atypical measles is being reported here for its rarity and clinical importance.

**Results and Discussion**

In India, states like Himachal Pradesh have achieved the high coverage of measles, a notifiable disease under universal immunization program but not rubella and hence, no national control programme and no programme-based vaccination. Many solitary as well as mixed outbreaks of measles, German measles, chickenpox/herpes zoster have been investigated and documented. In the outbreak settings, it is a matter of common observation that more than one virus are simultaneously infecting the population. In 2006, in Double infection of measles and German measles, we initiated investigation on the suspected outbreak of measles (febrile rash) to confirm diagnosis and formulate recommendations for prevention and control. Sixty case patients were identified from 1026 people in 5 villages. Of these, 41 were diagnosed by clinically, 8 were laboratory confirmed as measles, and 11 were epidemiologically linked German measles case patients. Seventy percent of the cases were vaccinated for measles, none for German measles. Out of the eight laboratory confirmed case patients, five had got previous measles vaccination. Prima facie, the clinical presentations of both rubella and modified measles were difficult to differentiate. The clinical features were fast to appear and then disappear quickly. [Figures 1 and 2].
In the second set of mixed outbreak of measles and chickenpox in 2007 twin outbreak struck three hilly villages of Northern Himachal. Initially, we investigated this propagated outbreak- Epidemiological investigation of mixed outbreaks of measles/varicella on the suspicion of measles but the epidemiologically linked sporadic confirmed case patients of varicella were also examined concurrently on the symptoms of maculopapulosvesicular rash. We identified 29/35 measles and 6/35 were confirmed as epidemiologically linked unvaccinated chickenpox case patients. The rash was atypical in appearance (maculopapular with few or no vesicles) in case patients. Although the severity of symptoms was mild in nature in varicella cases, yet in twin outbreak the case patients of measles were full blown while those of concurrent varicella were subdued. Therefore, there was not point of debate for varicella case patients’ throughout. The proportion of the children vaccinated was 95% for measles but nil for varicella. Three case patients of atypical measles with maculopapular rash leading to vesicular stage vis-a-vis varicella were observed. They were immunized against measles.

In the third set of outbreak in 2007, German measles outbreak bursts in two unvaccinated border,[18] we identified 116 cases in eight villages (112/116 clinically and 04/116 laboratory confirmed). Majority of cases were immunized against measles, but only minor cases for rubella. The laboratory confirmed four case patients of rubella (German measles) had previous shots of measles vaccination.

In the fourth set of outbreak in 2009, concurrent multiple outbreaks of varicella/rubella/German measles in unvaccinated children of co-educational Mount Carmel Senior Secondary School,[17], we identified 505 case patients from mixed outbreaks of varicella, measles and rubella (30/505 clinically, 467/505 epidemiologically linked and 8/505 laboratory confirmed case patients from a study population of 3280. We investigated the suspected outbreak with case definition of varicella but measles 20/3280 (0.60%) and rubella 34/3280 (1.03%) cases were also observed. 5/10 samples for IgM antibodies for chickenpox and 2/10 samples were positive for rubella. Vaccination for measles was 93%, 2% for rubella as MMR, and 5% for varicella. Two confirmed cases of rubella have been previously immunized against measles. The clinical presentations of both rubella and modified measles with fleeting maculopapular rash were the points of high debate.

In all the four outbreaks, one or more than one virus is infecting the population. It was crystal clearly observed and subsequently, based upon the presenting complaints, debate ensued among the colleagues for proper diagnosis and classification of these viral diseases. Mild febrile rashes were present both in German measles (rubella) and measles. Symptomatology in both the cases is so similar and maculopapular rash was so fleeting that it disappears in 1 to 2 days and to add confusion, the ELISA for both the results are sometimes, bothways (+/−). Then what? In all above mentioned outbreaks, majority of the case patients in all the hilly villages belonged to the older age group (11–20 years), suggesting an obvious shift to the higher age group. This suggests waning of immunity with age. However, waning of immunity as an effect of exposure to ultraviolet radiation, as observed by Prof. Mary Norval, cannot be ruled out. In addition to this, as the vaccine efficacy for measles is only 85% for first dose of measles at nine completed months, there is progressive accumulation of a small number of susceptible children in the community over the years. Such accumulations are typically caused by the combination of the measles vaccine efficacy that does not reach 100% and children left un-immunized each year. As the coverage increases, interepidemic interval increases as well as a shift toward older age groups may be observed as in Kangra.[15‑17]

We have investigated many of such outbreaks in field settings; either they are two in one (measles and rubella/or measles and chickenpox) or three in one (measles, rubella, and varicella). Modified measles is a distinct clinical entity characterized by less intense symptoms and a milder rash which may occur in individuals with pre-existing partial immunity induced by active or passive vaccination.[19] Such cases have also been labeled as modified measles among health-care professionals in the literature.[20] But based upon analytical studies and field observation, the symptomatology of modified measles and laboratory confirmed rubella case patients/epidemiologically linked cases are so similar that in most of the times, it gets extremely difficult to diagnose the cases in one group; modified measles or rubella or atypical cases. There is obvious point of conflict between clinician in the chamber and epidemiologist reporting from the field.

In conclusion, modified measles versus rubella versus atypical cases can occur concurrently in one outbreak setting and we need to be differentiating between modified measles and rubella case patients which are, at times a difficult task. Further research is needed to discover more of truth.

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