High prevalence of mumps in Lao People's Democratic Republic

J. M. Hübschen[1,2], K. Vilivong[1], C. Souvannaso[1], A. P. Black[1,2], N. Lütteke[1,2], B. Samountry[3], V. Phongsavath[4], B. Khamphaphongphane[5], J. Denny[6], C. Sayyavong[7], G. K. S. Woo[8], K. Sengsaya[5], A. Sausy[1,2], P. Vongphrachanh[5], P. Jutavijittum[9], D. Phonekeo[5,10] and C. P. Muller[1,2]

1) *LaoLuxLab, Institut Pasteur du Lao PDR, Vientiane, Lao PDR,* 2) *Institute of Immunology, Centre de Recherche Public de la Santé/Laboratoire National de Santé, Luxembourg City, Luxembourg,* 3) *Department of Pathology, Faculty of Medicine, University of Health Sciences, Vientiane, Lao PDR,* 4) *Section of Laboratory, Luangprabang Provincial Hospital, Luangprabang,* 5) *National Center for Laboratory and Epidemiology,* 6) *WHO Lao Country Office, Vientiane,* 7) *Vientiane Capital Health Office, Vientiane, Lao PDR,* 8) *Public Health Laboratory Services Branch, Department of Health, Centre for Health Protection, Hong Kong SAR, China,* 9) *Department of Pathology, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand and* 10) *Institut Pasteur du Lao PDR, Vientiane, Lao PDR*

Abstract

In the Lao People's Democratic Republic (PDR), mumps is not a notifiable disease and mumps vaccine is currently not included in the routine childhood immunization programme. In order to assess the burden of disease, we investigated the seroprevalence of mumps-specific IgG antibodies across four provinces. In addition, we genetically characterized mumps viruses from the past 3 years from several outbreaks and single cases. Blood and/or throat swabs from suspected cases were investigated for specific IgM antibodies or viral RNA. Mumps cases occurred between March and November in 2011–2013 and 5- to 15-year-olds were most affected. Four sequences from an outbreak in the north of Lao PDR in 2011 were identical and belonged to genotype G. Eight sequences from two outbreaks and two individual cases from 2012 and 2013 belonged to genotype J. In addition, sera collected from 2379 healthy infants and school pupils aged between 9 months and 19 years and from pregnant women aged between 16 and 46 years were investigated for mumps-specific IgG. Overall, 58.2% were positive, 39.5% were negative and the remaining 2.3% were equivocal. The seropositivity increased with age, with the lowest percentage found in <1-year-old infants (9.1%) and the highest in the cohort of pregnant women (69.2%). More female subjects than male subjects were seropositive (60.4 vs. 54.9%). There were some differences between the locations. Mumps should be a notifiable disease in Lao PDR in order to get more accurate case numbers and cost estimates for public health-care, and vaccination of children and high-risk groups should be considered.

Keywords: Genotype, Lao PDR, mumps, outbreak, seroprevalence
Original Submission: 28 October 2013; **Revised Submission:** 24 January 2014; **Accepted:** 31 January 2014
Editor: E. Bottieau
Article published online: 11 February 2014
Clin Microbiol Infect 2014; **20**: O664–O671
10.1111/1469-0691.12586

Corresponding author: C. P. Muller, Institute of Immunology, Centre de Recherche Public de la Santé / Laboratoire National de Santé, 20A, rue Auguste Lumière, L-1950 Luxembourg City, Luxembourg
E-mail: claude.muller@crp-sante.lu

Introduction

Mumps is a vaccine preventable disease caused by mumps virus (family, Paramyxoviridae; genus, Rubulavirus) with a subclinical course in up to one-third of all cases. Common manifestations include parotitis and respiratory symptoms, and orchitis in postpubertal male subjects [1]. Laboratory diagnosis relies on detection of specific IgM antibodies or mumps virus RNA. Based on 316 nucleotides covering the small hydrophobic (SH) gene region, 12 different genotypes of mumps virus have been proposed with genotypes C, F, G and H predominating in Asia [1]. In 2012, 120 out of 194 WHO member states (62%) were using mumps vaccine in their national immunization schedule [2]. In the Lao People's Democratic Republic (PDR), mumps is not a notifiable disease

and mumps vaccine is currently not included in the routine childhood immunization programme. Except for 2011, when only 54 cases were recorded by WHO [3], no data exist. In order to assess the real burden of disease, we investigated the seroprevalence of mumps-specific IgG antibodies across four provinces. In addition, we genetically characterized mumps viruses from the past 3 years from several outbreaks and single cases brought to our attention by the National Center for Laboratory and Epidemiology (NCLE) and medical doctors. Thus we provide here the first comprehensive information about mumps in Lao PDR as a guide for future public health decisions.

Materials and Methods

Data concerning the 2011 and 2013 outbreaks and the 2012 outbreaks in Saravane and Champasack province were collected by NCLE, in collaboration with the WHO Lao Country Office for 2011 data. The data for the 2012 Vientiane outbreak were obtained from the Vientiane Capital Health Office. Data for the sporadic cases were collected by the LaoLuxLab of the Institut Pasteur du Lao PDR.

Blood and/or throat swabs were taken during the outbreaks from some or all clinical cases and from the sporadic cases and were investigated for mumps-specific IgM antibodies (Euroimmun, Lübeck, Germany) or viral RNA, respectively. For RNA positive samples, the 316 nucleotide SH gene region was amplified and sequenced and the data were used for phylogenetic analyses according to WHO guidelines [1] with MEGA 4 software [4]. The sequences were submitted to GenBank under accession numbers KF438181-KF438184 and HG423644-HG423651.

Sera collected from healthy infants and school pupils aged between 9 months and 19 years and from pregnant women aged between 16 and 46 years were investigated for mumps-specific IgG antibodies using a commercially available ELISA kit (Euroimmun) according to the manufacturer's instructions. Equivocal samples were retested and classified according to the second test result as positive, negative or equivocal. Before blood collection, informed consent was obtained from all participants or their parents. Data such as age, sex and location were recorded and used for the seroprevalence analyses. For the blood collection, four different locations were selected: Savannakhet city in the south (participants between 5 and 19 years), Luangprabang city in the north (participants aged between 9 months and 19 years and pregnant women), Vientiane city (participants aged <1 year and pregnant women) and Borikhamxay province (participants aged between 5 and 19 years), both in the centre of the country. Fig. 1 was constructed using ArcView 9.3.1 software (Esri, California, USA). Free spatial data were downloaded from DIVA-GIS (http://www.diva-gis.org/Data). Ethical approval was given by the ethics committee of Lao PDR (NECHR 001/2011).

Results

Outbreak 2011 Oudomxay province

Between 10 March and 23 April 2011, a total of 61 suspected cases (based on sore throat or cervical/mandibular lymphadenopathy or parotid swelling), including three deaths, were investigated in Mokkha village, located in the Hoon district in Oudomxay province in Northern Lao PDR (Fig. 1). The majority of the patients were female (n = 32, 52.5%) and <16 years old (n = 56, 91.8%). The most affected age group was the 5–9 year olds (n = 26, 42.6%), followed by the 10–15 year olds (n = 17, 27.9%) and the 1–4 year olds (n = 13, 21.3%). The highest incidence of disease was observed in week 14 with 28 new mumps cases (Fig. 2a). Two 8-year-old girls and an 11-year-old boy died during week 12. Besides lymphadenopathy, headache, malaise or anorexia, also dizziness, lethargy, muscle pain or paralysis of the extremities were observed. For two of the three deceased patients, encephalitis was diagnosed as the cause of death. Mumps-specific IgM antibodies were detected in five out of six sera and mumps virus RNA was detected in four out of ten throat swabs. Thus, nine of the 16 patients from whom clinical specimens were available (56.3%), were laboratory-confirmed mumps cases. Interestingly, Coxsackievirus A16 was detected in one of the mumps PCR-positive samples and in one of the six mumps virus-negative throat swabs (both cases with disease onset in week 16). Rhinovirus was found in another mumps PCR-negative throat swab (case with disease onset also in week 16).

Outbreak 2012 Vientiane capital

Between 20 July and 2 August 2012, 12 mumps cases were recorded in Donexingxou village in the Sikhottabong district of Vientiane capital (Fig. 1). Most patients were male (n = 10, 83.3%) and the ages ranged from 4 to 19 years (median 10.5 years). The most affected age group was the 10–15 year olds (n = 7, 58.3%), followed by the 5–9 year olds (n = 3, 25.0%). Most cases occurred in week 31 (n = 7, 58.3%), followed by week 30 (n = 3, 25.0%) and week 29 (n = 2, 16.7%) (Fig. 2a). All patients were reported to have fever, parotitis and headache and five patients were admitted to the hospital. Throat swabs were collected from all hospitalized patients and four of the samples (80.0%) were positive for the