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Nasopharyngeal carriage of *Streptococcus pneumoniae* in adults infected with human immunodeficiency virus in Jakarta, Indonesia

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Summary This study investigated the distribution of serotype and antimicrobial susceptibility of *Streptococcus pneumoniae* carried by adults infected with human immunodeficiency virus (HIV) in Jakarta, Indonesia. Specimens of nasopharyngeal swab were collected from 200 HIV infected adults aged 21 to 63 years. Identification of *S. pneumoniae* was done by optochin susceptibility test and PCR for the presence of *psaA* and *lytA* genes. Serotyping was performed with sequential multiplex PCR and antibiotic susceptibility with the disk diffusion method. *S. pneumoniae* strains were carried by 10% adults with serotype 6A/B 20% was common serotype among cultured strains in 20 adults. Most of isolates were susceptible to chloramphenicol (80%) followed by clindamycin (75%), erythromycin (75%), penicillin (55%), and

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tetracycline (50%). This study found resistance to sulphamethoxazole/trimethoprim was most common with only 15% of strains being susceptible. High non-susceptibility to sulphamethoxazole/trimethoprim was observed in *S. pneumoniae* strains carried by HIV infected adults in Jakarta, Indonesia.

Introduction

Streptococcus pneumoniae infection is a major worldwide cause of morbidity and mortality especially in low income countries where pneumococcal conjugate vaccines (PCVs) are still underused [1]. *S. pneumoniae* carriage is considered to be an important source of horizontal spread of this pathogen within the community [2,3]. The epidemiology data of carriage for *S. pneumoniae* in developing countries is crucial for implementing appropriate vaccination strategies and evaluating their impact [1].

Human immunodeficiency virus (HIV) infection and AIDS increase the risk of invasive pneumococcal disease (IPD) [4]. Underlying HIV infection is an important risk factor for pneumonia morbidity and mortality in children [5]. *S. pneumoniae* is the leading bacterial opportunistic infection in HIV positive individuals [6]. Although, anti-retroviral treatment (ART) reduces their risk of IPD, however, it remains 20- to 40-fold greater than that of the general population [6].

The carriage prevalence of *S. pneumoniae* in HIV-infected children was 76% of 90 participants in Kilifi, Kenya [7]. Meanwhile, *S. pneumoniae* carriage among adults infected with HIV age 18 year or older were 17% and 18% in Brazil and Uganda respectively [8,9]. Onwubiku et al. reported this carriage of *S. pneumoniae* was 3.4% in HIV-infected patients after the introduction of PCV vaccination [10]. However, vaccination of HIV-infected mothers with pneumococcal polysaccharide vaccine (PPV) did not protect infants younger than 6 months of age from nasopharyngeal pneumococcal carriage [11]. Recently we reported that *S. pneumoniae* carriage in HIV-infected children (aged 4—144 months) was 46% in Jakarta, Indonesia [12]. In this present study, we investigated *S. pneumoniae* carriage in HIV adults (aged 21—63 years) in Jakarta, Indonesia. This study will provide the epidemiology data of *S. pneumoniae* carried by adults with HIV infection in Indonesia.

Methods

Specimen collection

A cross-sectional survey on serotype and antibiotic susceptibility of *S. pneumoniae* was performed in HIV-infected adults at the Unit Pelayanan Terpadu HIV (HIV Integrated Services), Cipto Mangunkusumo Hospital, Jakarta, Indonesia from August to October 2012. This study has been reviewed and approved by the ethical committee of the Faculty of Medicine, University of Indonesia, Jakarta, Indonesia. The participants signed informed consent and provided demographic information, such as age, sex, family member, and smoking. Detailed medical information on CD4 lymphocyte count within the past 3 months, use of highly active antiretroviral therapy (HAART), and use of antibiotics was recorded during the study. Nasopharyngeal swab specimens we collected using a flexible nasopharyngeal floxed swab (Copan, Italy no 503SC01) in skim milk tryptone glucose glycerol (STGG) transport medium as described previously [12]. The specimen of STGG sample was plated onto a 5% sheep blood agar supplemented with 5 mg/L gentamicin (SB-Gent), and incubated at 35 °C for 24 h with 5% CO_2. When alpha-hemolytic colonies growth on the SB-Gent plate, a single colony was re-cultured and tested by Gram-staining and tested for susceptibility to optochin.

Molecular identification of Streptococcus pneumoniae strain

Bacterial DNA was extracted as described previously [13]. *S. pneumoniae* strain was identified by the presence of *psaA* and *lytA* genes by polymerase chain reaction (PCR) as described previously [14,15]. A sequential multiplex PCR (SM-PCR) was performed for serotyping with an internal positive control targeting 160 bp fragment of capsule transcriptional regulator gene *wzg* (*cpsA*) universally present in *cps* operons of almost all serotypes [13].