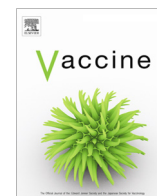


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## Intention to accept pertussis vaccine among pregnant women in Karachi, Pakistan

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### ARTICLE INFO

#### Article history:

Received 30 January 2017

Received in revised form 13 August 2017

Accepted 15 August 2017

Available online xxx

#### Keywords:

Pertussis

Tdap

Maternal immunization

Antenatal vaccination

Pregnant women

Vaccine acceptance

Pakistan

### ABSTRACT

**Background:** Maternal immunization against pertussis is a potential strategy to protect young infants from severe disease. We assessed factors associated with intention to accept pertussis vaccination among pregnant women in Karachi, Pakistan.

**Methods:** We conducted a cross-sectional survey between May and August 2013 in pregnant women who visited healthcare centers in urban slums of Karachi city. Women completed a survey examining socio-demographic factors, vaccination history, knowledge on pertussis disease, perception of vaccine recommendation sources, and potential influences on vaccine decision-making.

**Results:** Of the 283 participants, 259 (92%) provided their intention to either accept or decline pertussis vaccination. Eighty-three percent women were willing to accept the pertussis vaccine if offered during pregnancy. About half (53%) of the participants had ever heard of pertussis disease. Perceptions of pertussis vaccine efficacy, safety, and disease susceptibility were strongly associated with intention to accept pertussis vaccine ( $p < 0.01$ ). Healthcare providers, Ministry of Health, and mass media were considered as highly reliable sources of vaccine recommendation and associated with intention to accept antenatal pertussis vaccination ( $p < 0.001$ ). Healthcare provider recommendation was a common reason cited by respondents for pregnant women to accept antenatal pertussis vaccination ( $p = 0.0005$ ). However, opinion of primary decision-makers in the family (husbands and in-laws) was a crucial reason cited by respondents for pregnant women to reject pertussis vaccination in pregnancy ( $p = 0.003$ ).

**Conclusion:** Antenatal pertussis vaccination initiatives in South Asia should strongly consider inclusion of family members, healthcare providers, national health ministries, and mass media to help implement new vaccination programs.

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### 1. Introduction

Pertussis, or whooping cough, is a highly contagious acute respiratory infection. Infants too young to be completely vaccinated against pertussis are at the highest risk of experiencing severe complications and hospitalizations [1]. Family members and caregivers are often recognized as sources of pertussis transmission in infants [2–5]. Antenatal vaccination with tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) is a

potential strategy to prevent pertussis in mothers and their infants by passive transfer of maternal anti-pertussis antibodies and decreasing exposure through cocooning [3]. Since 2012, four countries – US, UK, Australia, and New Zealand – now recommend that all pregnant women receive a single dose of pertussis vaccination in late second or third trimester with every pregnancy irrespective of previous Tdap vaccination history [2,6–8].

Pakistan has one of the highest burden of childhood mortality attributable to vaccine-preventable diseases. Acute respiratory infections in Pakistan are the third leading cause of death in children aged under five years [9]. Moreover, in 2010 the annual incidence of acute lower respiratory infections in Pakistan ranked highest (6.7 million) among countries in the WHO Eastern

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Mediterranean Region [10]. The Expanded Program on Immunization (EPI) schedule in Pakistan currently does not recommend pertussis vaccination for pregnant women. Tetanus toxoid (TT) is the only recommended vaccine in the EPI schedule for pregnant women to prevent maternal and neonatal tetanus [11]. The coverage ranges from 59 to 65% for receiving two or more doses of TT vaccination in pregnancy [12,13].

There is need to understand the feasibility and acceptability of antenatal pertussis vaccination before potential national program implementation in Pakistan. Uptake of antenatal Tdap vaccine is low even in countries where the vaccine is currently recommended. For example, in the United States, Tdap vaccine coverage is about 48.8% in pregnancy [14]. The objective of this study is to understand the facilitators and barriers to acceptance of antenatal Tdap vaccination in Karachi, Pakistan.

## 2. Methods

### 2.1. Study location

The study was conducted in three primary healthcare centers managed by the Department of Pediatrics and Child Health of Aga Khan University. The primary healthcare centers (Bilal Colony, Ibrahim Haideri, and Ali Akbar Shah) serve low-income urban settlements of Korangi Industrial Area in Karachi, Pakistan. The population comprises of multiple ethno-linguistic groups such as Urdu speaking, Punjabi, Pashtun, Bengali, Sindhi and Baloch. There is diversity in health-seeking behaviors in these communities ranging from public (primary, secondary and tertiary) to private (profit and not-for-profit) sector facilities. During the period 2011–2013, 70% women sought antenatal care at least once by six months of pregnancy with visits made to physicians, nurses, traditional birth attendants and midwives. Moreover, immunization status of the infants in Pakistan varies by ethnicity, where the DTP3 coverage is lowest among Pashtun (67%) and Bengali (48%) populations [15].

### 2.2. Study design

We conducted a facility-based cross-sectional observational survey between May and August 2013 by administering a 51-item questionnaire to examine knowledge, attitude and belief about pertussis and antenatal vaccination among pregnant women attending participating primary healthcare centers. Women aged >18 years in any trimester of pregnancy attending primary healthcare centers for routine antenatal care were eligible for participation. Pregnant women who were seriously ill and/or referred to tertiary care hospital for further consultation at the time of recruitment were excluded. Trained study staff members approached eligible participants to elucidate the consent form in which the nature and purpose of the study, procedures, possible risks and benefits involved, confidentiality, and right to withdraw from the study were explained. Written consent was obtained unless a participant was unable to read and/or write, wherein a healthcare staff member unaffiliated with the study presided over the consent discussion to ensure that the participant understood the information presented. As proof of consent, participant's thumb impression and witness's signature were obtained. For participants who were unable to read, questions from the survey were read out aloud and responses were recorded on a printed version of the questionnaire.

### 2.3. Study questionnaire

Demographic questions ascertained from participants included age, educational attainment, marital status, occupation, mother tongue,

ethnicity, reproductive history, number of children ever born, and any children died of illness. We determined socioeconomic status of the participant based on ownership of house in the study area. We asked participants when they first attended antenatal care, where and who provided care, and any complications or hospitalizations in current pregnancy. We also asked questions regarding vaccination history of the participant, whether as a child or adolescent they were vaccinated with DPT and tetanus vaccines, and vaccines recommended and received in current and previous pregnancies. We assessed future vaccine uptake of the participant by asking whether they plan to get any vaccines in current pregnancy and who decides about seeking healthcare for family members in the household. We assessed disease knowledge by asking participants if they can identify symptoms associated with pertussis/whooping cough/100-day-cough/kaali khansi. Further, we assessed health belief model dimensions for pertussis vaccine acceptance by asking questions related to pertussis vaccine efficacy, safety, and disease susceptibility. Perception of Tdap vaccine efficacy was assessed through questions, "Is a pregnant women protected against whooping cough if she is vaccinated against pertussis?" and "Would a baby be protected against whooping cough, if his/her mother received a pertussis vaccine during pregnancy?". Perception of Tdap vaccine safety was assessed through the question "Do you think it is safe for pregnant women to receive pertussis vaccine?". Perception of pertussis disease susceptibility was assessed through questions, "Is it likely for a pregnant women who was not vaccinated against pertussis to contract whooping cough?" and "Is it likely for a baby to acquire pertussis/whooping cough?".

### 2.4. Outcome measures

The primary outcome was intention to accept vaccination against pertussis if offered by EPI as standard of care during pregnancy.

### 2.5. Statistical analysis

Data was analyzed using SAS version 9.4 statistical software (SAS Institute Inc., Cary, NC). In our study questionnaire, we provided three response options i.e. 'yes', 'no' and 'don't know' for questions related to pertussis disease knowledge; vaccination history and experience; vaccinations in current pregnancy; future vaccination plans; and health belief model dimensions for pertussis vaccine acceptance. We included 'don't know' as a response option to assess how participants would respond to these questions. We recoded 'don't know' responses from participants as 'no' in our analysis as it might indicate a lack in knowledge as the pertussis vaccine is not in the EPI schedule for pregnant women. Age of the participants was dichotomized based on median value. We also dichotomized educational level, marital status, employment status and socioeconomic status. Number of children ever born to a pregnant woman was categorized into one, two, three and more than three. Gestational age was categorized into trimesters.

Descriptive statistics were conducted for the demographic characteristics in relation to intent of antenatal pertussis vaccine uptake. Univariate logistic regression was used to determine unadjusted odds ratios between each study variable and intention to accept antenatal pertussis vaccine. Wald chi-square test was used to analyze the categorical variables. Two-tailed *p* values <0.05 were considered statistically significant.

### 2.6. Ethical approval & financial disclosure

The research protocol was approved by the Institutional Review Board of Emory University and the Ethics Research Committee of

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