Dengue vaccine acceptance and associated factors in Indonesia: A community-based cross-sectional survey in Aceh

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ABSTRACT

Background: The first dengue vaccine (DV) has been licensed in some countries, but an assessment of the public's acceptance of DV is widely lacking. This study aimed to explore and understand DV acceptance and its associated explanatory variables among healthy inhabitants of Aceh, Indonesia.

Methods: A community-based cross-sectional survey was conducted from November 2014 to March 2015 in nine regencies of Aceh that were selected randomly. A set of validated questionnaires covering a range of explanatory variables and DV acceptance was used to conduct the interviews. A multi-step logistic regression analysis and Spearman's rank correlation were employed to assess the role of explanatory variables in DV acceptance.

Results: We included 652 community members in the final analysis and found that 77.3% of them were willing to accept the DV. Gender, monthly income, socioeconomic status (SES), attitude toward dengue fever (DF) and attitude toward vaccination practice were associated with DV acceptance in bivariate analyses ($P < 0.05$). A correlation analysis confirmed that attitude toward vaccination practice and attitude toward DF were strongly correlated with DV acceptance, $r_s = 0.41$ and $r_s = 0.39$, respectively ($P < 0.001$). The multivariate analysis revealed that a high monthly income, high SES, and a good attitude toward vaccination practice and toward DF were independent predictors of DV acceptance.

Conclusion: The acceptance rate of the DV among inhabitants of Aceh, Indonesia was relatively high, and the strongest associated factors of higher support for the DV were a good attitude toward vaccination practices and a good attitude toward DF.

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1. Introduction

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Dengue fever (DF) has been considered the most important mosquito-borne viral disease in humans. The incidence of DF has increased 30-fold in the past 50 years, and it is endemic to more than 100 countries [1]. It is estimated that almost 50% of the world's population lives in areas that are at risk for DF [2]. The DF burden in Asia continues to be the highest globally, and Indonesia is the largest country in Southeast Asia and the Western Pacific region in which DF is prevalent. Since the first documented case in 1968 in Jakarta until the present day, DF has been prevalent in all provinces and has become a major public health problem with a high incidence, morbidity and mortality rate [3]. One of Indonesia's provinces with an increased incidence of dengue is Aceh [4], the most severely affected area by the earthquake and tsunami of 26 December 2004. In 2005, the WHO warned of an increased risk of DF in tsunami-affected areas [5]. There was an increase in registered DF cases in Aceh from 2.76 to 46.66 per 100,000 in 2003 and 2014, respectively [4,6].

The dengue vaccination era has begun. A dengue vaccine (DV) produced by Sanofi Pasteur, CYD-TDV, has been licensed in Mexico, the Philippines and Brazil. Acceptance of the DV is a critical factor for the success of dengue vaccination programs, and a high

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level of acceptance is therefore required. However, assessments of the public's acceptance of the DV and its associated factors are widely lacking. An assessment of the public's acceptance of the DV may influence the adaptation of dengue vaccination strategies in certain region, especially in developing countries [7]. Therefore, it is important to assess public acceptance of the DV to generate recommendations for policy makers. This study aimed to provide information on DV acceptance and its associated factors among healthy inhabitants of Aceh, Indonesia.

2. Methods

2.1. Ethical clearance

The Ethical Clearance Committee of the School of Medicine, Syiah Kuala University, Banda Aceh reviewed and approved the protocol of this study. Participation in this study was voluntary, and participants received no incentive. Before enrollment, all participants received a brief explanation of the aims, risks and benefits of the study and were informed that they could terminate the interviews at any time. All participants signed written informed consent forms prior to enrollment.

2.2. Study sites and sampling procedures

Aceh is one of 34 provinces of Indonesia and is located in the northern Sumatra Island, the westernmost part of the Indonesian archipelago. The total area of Aceh is approximately 56,770 km^2 and consists of 23 regencies (*Kabupaten/Kotamadya*), with a total population of approximately 4,906,800 in 2014 [8]. To represent the population, nine out of 23 regencies were randomly selected (Aceh Tengah, Aceh Besar, Aceh Utara, Aceh Singkil, Aceh Timur, Aceh Selatan, Aceh Tamiang, Langsa and Sabang). Forty-five participants from each regency were required as the minimum sample size based on the assumption of a vaccine acceptability rate of 50% with a 5% margin of error and a 95% confidence level. However, more participants were recruited from regencies that had a higher population size.

2.3. Study design and study instrument

To assess DV acceptance and its associated factors, a community-based cross-sectional study was conducted from November 2014 to March 2015. To facilitate the interviews, a set of validated and pre-tested questionnaires [9–12] was used. A response variable (DV acceptance) and a range of explanatory variables (socioeconomic status (SES), knowledge, attitude and practice (KAP) regarding DF, attitudes toward vaccine practice, history of past DF and other demographic data) were covered in the questionnaires. A reliability test of the questionnaires was conducted in two regencies (Aceh Barat Daya and Pidie Jaya), and a 0.7 cut-off point of Cronbach's alpha was applied (indicated good internal consistency of the items in the scale).

2.4. Research variables

2.4.1. Response variable

To assess DV acceptance, it was hypothesized that the DV would be safe and protective against dengue virus infection. No information related to the dose, administration procedure, or price of the DV was provided. Participants were asked to respond the question, "*would it be likely for you to vaccinate your children (if you have children)?*" The possible responses were scored on a five-point Likert-type scale, ranging from "very unlikely" to "very likely."

2.4.2. Explanatory variables

2.4.2.1. SES.
The SES of the participants was generated based on fifteen indicators of the assets they owned. Ownership of the indicator assets was used to construct an asset index based on Principal Component Analysis (PCA) [9]. The indicator assets are radio, television, refrigerator, bicycle, motorcycles, personal computer, internet connection, car, electricity, landline phone, piped-water, flushed toilet, housing unit, and housing characteristics including a separate kitchen, non-dirt flooring, roof tiles, and brick walls. SES was then classified into 5 quintiles, the 1st quintile representing the poorest and the 5th quintile representing the least poor.

2.4.2.2. KAP regarding DF.
To assess the KAP domain regarding DF, a set of three questionnaires consisting of 28, 15 and 16 questions/statements adapted from previous studies [10–12] was used. For knowledge, the possible responses to all of the questions were "yes" or "no." Each valid response of knowledge regarding DF (signs, symptoms and transmission of dengue viruses) was given a score of one, whereas an incorrect response was scored as zero. Each statement within the attitude domain was introduced, to which participants could (strongly) disagree or (strongly) agree on a Likert-type scale. For preventive practices against DF, each valid response of a measure to prevent mosquito-man contact and eliminate mosquito breeding sites was given a score of one. For each of the KAP domain's presented, higher scores indicated better knowledge, a more positive attitude and better preventive practices regarding DF, respectively.

2.4.2.3. Attitude toward vaccination practice.
To measure participants' attitude toward vaccination practice, five statements from a previous study [10] were used. The possible responses were on a Likert-type scale ranging from "strongly disagree" to "strongly agree." A score of one to five could be received for each statement, and higher scores indicated a more positive attitude.

2.4.2.4. History of past DF and other demographic data.
Participants' personal history of previous episodes of DF, having a family member(s) with a history of DF and other demographic background data such as age, educational attainment, type of occupation, marital status, monthly income and type of residence were collected from all participants.

2.5. Statistical analysis

For each participant, the scores for KAP regarding DF and for attitude toward vaccination practice were computed as the sum of the response scores within each domain. Additive scale scores for the KAP domains ranged from 0 to 28, 15 to 75 and 0 to 16 for the knowledge, attitude and practice domains, respectively, and from 5 to 25 for attitude toward vaccination practice. For the statistical analysis, the level of these domains was dichotomized into "good" and "poor" based on an 80% cut-off point, whereas DV acceptance was categorized into "willing" (very likely and likely) and "not willing" (undecided, unlikely and very unlikely). To determine the role of the explanatory variables in DV acceptance, multiple step logistic regression and Spearman's rank correlation (r_s) were employed. In the univariate logistic regression, all explanatory factors were included, and significant explanatory factors ($P \leq 0.25$) were entered into the multivariate analysis. The estimated odds ratio (OR) was interpreted in relation to one of the categories, which was designated as the reference category. All analyses were performed using SPSS Version 15 (Chicago, IL).