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Knowledge and attitudes about Ebola vaccine among the general population in Sierra Leone

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ABSTRACT

Background: Clinical trials of Ebola vaccine are ongoing. Before it becomes commercially available, understanding the Ebola vaccine-related knowledge and attitude of the general population is imperative to developing an effective vaccine coverage strategy.
Methods: We conducted a survey including 400 participants from general communities of the West Area Rural District, Sierra Leone. Knowledge and attitudes about Ebola vaccine were investigated, and the determinants of having knowledge and a positive attitude toward accepting vaccination were identified.
Results: Over half (55.8%) of the participants were aware of Ebola vaccine. About 60% of the participants were willing to be study subjects if the Ebola vaccine clinical trial were conducted in their communities. Most of the participants (72.5%) were willing to take Ebola vaccination if it was free of charge. Given that the vaccination was not free, the proportion willing to pay a fee to take the vaccination declined dramatically to 26.6%. Using a forward step-wise logistic model, monthly salary was identified as the single determinant (OR for every 100,000 Leones increase: 1.17, 95%CI: 1.04–1.31) for awareness of Ebola vaccine, which was identified as the determinant (OR: 1.88, 95%CI: 1.17–3.02) for free vaccination uptake willingness. The combination of monthly salary, monthly average income of family members and their interaction was found to be associated with charged vaccination uptake willingness.
Discussion: Measures are still needed to promote the Ebola vaccine awareness and knowledge updating. Free or low-priced vaccine could increase the vaccination acceptability of the general community population significantly.

1. Introduction

Sierra Leone is the most affected country in the large Ebola outbreak occurring in West Africa. As of November 29, 2015, 28,637 cases of Ebola Virus Disease (EVD) with 11,135 deaths have been reported [14]. As the number of people with Ebola has declined since the height of the outbreak, phase 3 trials of experimental vaccines against Ebola have begun in five districts of Sierra Leone which have been heavily affected by the Ebola outbreak in the past few months, including the Western Area Rural district [15]. A safe and effective vaccine would be a very important tool to stop Ebola in the future. However, to date, there is no published data on knowledge and attitudes about the Ebola vaccine in the general population of Sierra Leone. Filling this gap in understanding is crucial for developing an effective vaccine coverage strategy in near future.

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2. Materials and methods

2.1. Participants

This survey was conducted from March 10 to 15 of 2015 in Jui, Kossoh town and Grafton in the West Area Rural District of Sierra Leone, which was one of the districts most heavily affected by Ebola. We used a questionnaire to survey the general population in these communities focusing on demographic characteristics, awareness of Ebola vaccine and attitude to vaccination uptake. Investigators were trained to conduct the survey according to a set of standard guidelines (Supplement 1). All 30 villages in Jui, Kossoh town and Grafton were covered in this survey. In each village, 13–14 households with different geographic locations (2–3 households in the center, north, south, east and west of each village) were randomly selected and then in each selected household one eligible family member (18 years old or above) was selected and surveyed. A total of 400 residents (Jui 199, Kossoh town 81, Grafton 120) participated in this survey.

2.2. Ethics statement

As the Ebola infections still occurred in the community during this survey, verbal rather than written informed consent was taken in order to minimize physical contact. No specimen or samples were collected from the participants. No distinguishable personal information was recorded and all the data were analyzed anonymously. This survey was approved by the Ethics committee of the District Health Manage Team (DHMT) of West Area, Sierra Leone.

2.3. Statistical analyses

Descriptive statistics comprised the calculation of median and interquartile ranges (IQRs) for continuous variables and absolute numbers and proportions for categorical variables. Pearson chi-square test was used for comparing proportions, and continuity correction or Fisher's Exact Test was used if appropriate. Kruskal–Wallis *H* test or Mann–Whitney *U* test were used for comparison of medians. Binary/multinomial forward step-wise logistic regression modeling was employed for multivariable selections and odds ratio computing. Hosmer and Lemeshow Test, Cox & Snell R Square and Nagelkerke R Square were used for Goodness-of-fit test. Statistical significance level was set at <0.05. Statistical analyses were conducted by R version 3.0.2.

3. Results

3.1. Demographic characteristics

A total of 400 participants were included in the analyses. Of them, 199 participants came from Jui, 81 from Kossoh town and 120 from Grafton. Age and gender were controlled during the selection of the participants to avoid selection bias (Supplement 1). Male participants accounted for 52.6% of the total. The median age was 37 years (interquartile range, 29–46). Participants aged 18–29 years accounted for 26.3% of the total; those aged 30–44 years and those older than 44 years accounted for 42.4% and 31.3% of the participants, respectively. In the context of religious faith, 47.8% of the participants were Christians and 51.8% of them were Muslims. About 70% of the participants only received secondary education or lower. Participants who received no education accounted for 24.1% of the total.

3.2. Knowledge about Ebola vaccine

In total, 55.8% of the participants reported having ever heard of Ebola vaccine. However, a large part (68.3%) of these failed to correctly answer the question about the status of Ebola vaccine (under clinical trial). The U.S. was most frequently (50.2%) identified as a country that was developing Ebola vaccine among the participants aware of Ebola vaccine, followed by China (39.9%) and Britain (20.6%).

Age and gender were not found to be associated with the awareness of Ebola vaccine. There were no statistically significant differences in residence, religious faith, occupations or education majors found between participants who had ever heard and never heard of Ebola vaccine. Both the medians of monthly salary and monthly average income of family members were significantly higher in those who were aware of Ebola vaccine ($P = 0.001$ and 0.007, respectively). The proportion of working in urban districts (18.5% vs. 9.7%, $P = 0.019$) and having family members as health care workers (12.6% vs. 3.3%, $P = 0.009$) were significantly higher in participants aware of Ebola vaccine. The proportion that received college or university education was 35.7% in participants aware of Ebola vaccine and was 23.6% in participants unaware of the vaccine ($P = 0.058$) (Table 1).

All aforementioned variables associated with the awareness of Ebola vaccine (differences were significant or close to significant) were further selected using a forward step-wise multivariate logistic model. Monthly salary was identified as the single determinant for awareness of Ebola vaccine. A 17% increase in awareness of Ebola vaccine was found for every 100,000 Leones increase in monthly salary (Odds Ratio (OR): 1.17, 95%CI: 1.04–1.31).

3.3. Attitude to Ebola vaccine

Most of the participants (72.5%) were willing to take Ebola vaccination if it was free of charge. When asked whether they would be willing if there was a charge, the proportion willing to take Ebola vaccine declined dramatically to 26.6%. A large proportion of the participants (42.0%) had no intention to be vaccinated regardless of how much was the cost. The vaccination willingness of the rest of the participants (31.4%) depended on the cost of the vaccine. The median of the maximum fee that they were willing to pay for the vaccination was 5000 Leones (about 1.11 US dollars) (interquartile range: 5000–15,000 Leones, i.e. 1.11–3.34 USD). The most frequent reasons for being willing to take the Ebola vaccination were "It can prevent Ebola" (81.7%), "Vaccine is safe" (62.1%) and "Ebola is fatal" (45.5%). The most common reasons for the denial of the vaccination were "I worry about the side effect" (59.1%), "I worry about the safety" (42.7%), "I worry about the effectiveness" (27.3%). About 60% of the participants were willing to be the recipients if the Ebola vaccine clinical trial were conducted in their communities.

In the stratified analyses of factors associated with willingness to take free Ebola vaccination, no significant differences in participants' general characteristics were found between those willing to take and those unwilling to, except for family member's having medical background. The proportion of having family members as health care workers was significantly higher in those willing to take free Ebola vaccination (10.3% vs. 4.0%, $P = 0.029$). In addition, awareness of Ebola vaccine was found to be having a significant influence on individuals' willingness to take free Ebola vaccination. Most of those (60.3%) willing to take free Ebola vaccination were aware of Ebola vaccine while most of those (56.4%) unwilling to take free vaccination were unaware of Ebola vaccine ($P = 0.003$). These two variables were further selected by forward step-wise logistic regression model. Awareness of Ebola vaccine was identified as the only determinant for taking Free Ebola vaccination willingness (OR: 1.88, 95%CI: 1.17–3.02) (Table 2).

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