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Original Article

Maternal knowledge and attitudes towards rotavirus diarrhea and vaccine acceptance in Yogyakarta, Indonesia: a qualitative study

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Abstract

Background Rotavirus is a leading cause of hospitalized diarrhea cases in Indonesia. Despite the rotavirus vaccine being recommended by the *Indonesian Pediatric Society* since 2011, it has yet to be been included in the Indonesian national immunization program (NIP) schedule.

Objective To explore maternal knowledge of and attitudes towards rotavirus diarrhea, as well as barriers to vaccine acceptance in Yogyakarta, Indonesia.

Methods We conducted 26 in-depth interviews in two districts (rural and urban areas) of Yogyakarta Province, Indonesia. Participants included women in their third trimester of pregnancy and mothers of infants younger than 14 weeks. We then proceeded with thematic analysis.

Results Participants did not perceive diarrhea as being a priority health problem. Very few had heard of rotavirus diarrhea or were aware of vaccine availability. While participants would accept vaccinating their children against rotavirus, some key barriers impacted vaccine use. As the rotavirus vaccine is not included in the Indonesian NIP, parents perceived it as not essential. Parents were concerned about the safety and benefit of the vaccine due to its perceived newness. Other concerns were cost and halal status. Participants expressed a need for more information on the vaccine's effectiveness and safety, with their primary healthcare providers (HCPs) considered to play the most important role in vaccine acceptance.

Conclusions In Yogyakarta, Indonesia, awareness of the seriousness of rotavirus disease and the availability of the rotavirus vaccine is low. Its newness, safety, efficacy, and cost, and doubts about its halal status, were barriers to vaccine acceptance. Information and recommendations from HCPs play an essential role in vaccine acceptance. **[Paediatr Indones. 2022;62:333-40 DOI: https://doi.org/10.14238/pi62.4.2022.333-40**].

Keywords: *vaccine acceptance; knowledge; mother; rotavirus*

Diarrheal diseases are among the leading causes of morbidity and mortality in children younger than five years, causing more than half a million deaths per year globally, with most deaths occurring in low- to low-middle-income countries.[1] Rotavirus diarrhea accounts for a large proportion, 55% in Asia and 32% in Africa, hospitalizations for acute watery diarrheal, and 28% of watery diarrheal deaths are due to rotavirus.[2] *The Indonesian Rotavirus Surveillance Network* (IRSN) conducted hospital-based surveillance studies across Indonesia from 1978 to 2015 and found that 38-62% of watery diarrhea was caused by rotavirus.[3-5] The estimated total direct medical costs of rotavirus outpatient and inpatient care in Indonesia amount to US$ 16.7million per year.[6] Reinfections with rotavirus

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are common throughout life, although disease severity is reduced with repeat infections.[7] Repeated infections at a younger age lead to growth faltering and, subsequently, stunting, which is associated with a decrease in cognitive development.[8,9]

Due to the high transmissibility of rotavirus, sanitation and hygiene improvements alone are insufficient to prevent rotavirus disease. Vaccination is the most effective prevention.[7] In 2013, the *World Health Organization* (WHO) recommended the inclusion of a rotavirus vaccine into all national immunization programs (NIP), especially in regions with a high mortality rate of rotavirus-associated diarrhea, including South-East Asia.[10] To date, 99 countries have introduced the vaccine (93 at the national level and 6 at the subnational level), including 73 Gavi-eligible countries.[11] Rotavirus vaccination can prevent nearly 600,000 deaths and save approximately US$484.1 million, from a government perspective, and US$878.0 million from a societal perspective.[12] A recent systematic review (2019) on rotavirus vaccines showed evidence of the vaccine's effectiveness in preventing death by rotavirus disease and vaccine safety, both in developed and developing countries.[13]

Since 2011, two commercial rotavirus vaccines, *RotaTeq®* (*Merck Vaccines*, USA) and *Rotarix®* (*GlaxoSmithKline Biologicals*, Belgium), have been licensed in Indonesia and recommended by the *Indonesian Pediatric Society*. However, it has not been included in the Indonesian NIP schedule. According to the WHO, some key issues should be considered before introducing a new vaccine into a NIP, including community perceptions of disease severity and susceptibility, as well as vaccine efficacy and safety.14 We conducted a qualitative study in Yogyakarta, Indonesia, to explore the knowledge and attitudes to rotavirus diarrhea and barriers to the acceptance of the vaccine among pregnant women and mothers of infants.

Methods

This qualitative study is a part of a more extensive study exploring rotavirus vaccine acceptance among three groups: parents (pregnant women and mothers), healthcare providers (HCPs), and key community-religious leaders.[15,16] The present study was focused on mothers. Between August and October 2013, we conducted in-depth interviews in two districts of Yogyakarta Province: Yogyakarta and Sleman, which represent urban and rural areas, respectively. We complied with the *Consolidated Criteria for Reporting Qualitative Research* (COREQ) checklist (**Appendix 1**).[17]

We invited pregnant women in their third trimester and mothers of infants aged less than 14 weeks to participate. The infant age limit reflects the specified cut-off period for the first dose of the rotavirus vaccine. Midwives identified potential participants from community member registries and offered them invitation letters and supporting documents during clinic hours. The research staff followed up with potential participants by telephone. Before the interview, the participants and researchers did not know each other. At the interview, participants provided written informed consent and were assured confidentiality.

The authors developed an interview guide based on a literature review. We conducted weekly team meetings to discuss preliminary findings, as well as modify and revise interview guides as needed. The questions covered themes including knowledge, attitudes, and perceptions of diarrhea, awareness and acceptance of the rotavirus vaccine, and the need for information about the disease and the vaccine. We paraphrased and asked additional questions to seek clarification during the interviews to ensure that the study included most of the question topics. We provided a brief, standard, written explanation of rotavirus diarrhea and the vaccine after ascertaining participant baseline knowledge about rotavirus. Participants were debriefed after the interview. We re-contacted participants if further clarification was required. We recruited participants until data was saturated, i.e., no new ideas or issues were raised in subsequent sessions. Three trained and experienced researchers, including an anthropologist and a sociologist from the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada (*Fakultas Kedokteran, Kesehatan Masyarakat dan Keperawatan UGM/FK-KMK UGM*) who were familiar with the data collection method, conducted the interviews in the participants' homes for an average of 45-60 minutes per interview. No observers

were present.

All interviews were conducted in the local language and translated into English by a professional translator. Interviews were digitally recorded and professionally transcribed verbatim. Two experienced investigators with doctoral degrees (SP, medical anthropologist, and MN, pediatrician-public health researcher) independently analyzed the transcripts manually and constructed it, cross-checked, and finalized a code list of major themes. The Medical and Health Research Ethics Committee (MHREC) of FK-KMK UGM and the University of New South Wales, Australia (HC13079) approved the study.

Results

All 26 invited respondents participated in the study, yielding a 100% response rate. Respondents consisted of 17 primary caregivers (mothers) and nine pregnant women, all of whom participated in in-depth interviews. Two out of the 17 mothers (11%) had vaccinated their children against rotavirus. The mean age of participants was 31 years (range 22 to 44 years). Twenty (77%) participants had completed at least senior high school; 17 (65%) were full-time homemakers (**Table 1**).

Overall, the general knowledge of participants regarding diarrheal disease was fair. Changes in stool consistency, frequent defecation, abdominal pain, and dehydration were symptoms commonly cited by participants. Participants recognized that poor hygiene and sanitation, irregular eating schedules, and eating the "wrong food" were causes of diarrhea. Improved sanitation and hygiene behavior were reported as effective approaches to prevent diarrheal disease: "I have already kept clean; my children do not get diarrhea. Just last time during the earthquake when it was dirty, now it is clean" (mother of three children).

They perceived the use of oral rehydration solution (ORS), increased fluid intake, and continued breastfeeding as effective treatments for diarrhea. "Give Oralit [ORS] first. When still a baby, just give him enough breast milk because the baby has to breastfeed to prevent dehydration... If her condition becomes more severe, then consult the doctor" (pregnant woman).

The low risk of acquiring diarrhea was a common emergent theme, with diarrhea not being perceived as a high-priority health issue for children. However, participants did recognize that diarrhea could become a severe condition if not managed appropriately. "Diarrhea is a mild disease. The elders say, if a child gets diarrhea, it's called 'ngenteng-ngentengi' [getting lighter/shedding excess burden], in order for the child to become smarter. However, diarrhea can also be severe... If it continues, it can be serious" (mother of two children).

Severe diarrhea was perceived as diarrhea presenting with vomiting, frequent watery stool, fever, or bloody stool. Most participants were aware of the need to visit HCPs if diarrhea persisted or was accompanied by vomiting, fever, or bloody stool. "If there is no fever, it means the diarrhea is mild, if the stools are watery and frequent, more than five times, it is severe, very severe if with blood, (the child) should be brought to an HCP" (mother of two children).

After receiving information on the signs and symptoms of rotavirus diarrhea, the local term 'muntaber' (frequent vomiting and diarrhea) was associated as being rotavirus diarrhea. There was a perception that 'muntaber' was associated with serious diarrhea. However, the perception that 'muntaber' could be prevented by high sanitation and hygiene remained. "Yes, 'muntaber' is dangerous… It will make the body weak and dehydrated" (mother of a 2-month-old boy). "I am really worried about 'muntaber,' but if we keep healthy and clean, it will prevent the children from the disease" (pregnant woman).

Aside from the two mothers who had vaccinated their children against rotavirus, only one participant had heard of the rotavirus vaccine. After receiving information on the rotavirus vaccine, most participants

Table 1. Characteristics of respondents

Variables	N=26
Type, n	
Pregnant women in third trimester	9
Mothers of infants aged <14 weeks	17
Median age, years (range)	31 (22-44)
Number of children, n	
None	3
1-2	17
≥3	6
Education level attained, n	
<9 years (junior high or less)	6
Completed senior high	15
University degree	5

perceived that it is an important method to prevent severe diarrhea. Furthermore, when asked about their intention to vaccinate their child, over half indicated that they would vaccinate their child with the rotavirus vaccine. Participants commonly highlighted that they needed to discuss it with their HCP before accepting the vaccine. They indicated that they trusted their HCP, and would vaccinate their children according to their HCP's recommendation.

We identified some concerns regarding the vaccine, with consistently emerging themes summarized in **Table 2**. The most common issue raised was that the vaccine was not included in the Indonesian NIP, therefore, parents perceived it as not important. "If [a vaccine] is not obligatory, it means it is not important, right?" (pregnant woman).

Participants were concerned that the vaccine was too new and that there needed to be more evidence of the vaccine's effectiveness and safety. "Yeah, for the new vaccines, we are still confused about whether to give it or not. Will the baby respond to the vaccine well, or will it lower their immune system? So, I only give the obligatory ones." (mother of a child). The cost of the vaccine, halal status, and the use of porcine trypsin in the vaccine production process were also significant barriers.

Vaccine information and recommendations were mainly sought from primary HCPs, especially midwives. However, they mentioned that their HCP provided limited information and only on the recommended vaccines on the NIP due to long waiting times and short consultations. "…in the primary healthcare center, if we do not ask, they do not give any information" (mother of two children). Other sources of information included healthcare volunteers (cadres), relatives, friends, maternal-child health books, leaflets, and the internet. "I read from the maternal-child health book. I know it (rotavirus vaccine) from the leaflet, and then I asked the doctor" (mother of a rotavirus-vaccinated child).

Participants expressed a desire to receive more information about rotavirus disease and the vaccine. Suggested methods for disseminating the information included a personal consultation by primary HCPs, leaflets, and a group education session for pregnant women/new mothers. Islamic religious leaders were also identified as an essential source for disseminating the information.

Discussion

This study explored the knowledge of and attitudes towards rotavirus diarrhea and the level of vaccine acceptance of amongst mothers in Yogyakarta, Indonesia. We found that participants were unaware of the burden of rotavirus disease or the availability of a vaccine. Most subjects believed their children had low susceptibility to the disease. They perceived that they could protect their child from diarrhea if they maintained strict sanitation-hygiene behaviors and breastfed. This finding was similar to the more recent multi-countries survey (2018), involving 1,500 participants including 250 parents from Indonesia. They reported that only 36% of Indonesian parents were aware that all children become infected with rotavirus by the age of 5 years.[18] Prioritizing the importance of rotavirus disease is the first step towards successfully implementing the vaccine.[14] Our participants perceived diarrhea as an accepted and manageable disease. Increasing fluid intake and use of ORS were considered to be simple methods to manage diarrhea. While it appears that past efforts to educate the community about the importance of preventing and managing classic diarrhea appear to have been successful, renewed efforts are needed to establish the importance of rotavirus as a causative agent of diarrhea. Compared to classic diarrhea, rotavirus diarrhea is significantly more severe due to the increased risk of vomiting and difficulties in the

Table 2. Consistently emerging themes

- Respondents were not aware of the burden of diarrheal disease.
- Respondents did not perceive their child's susceptibility to acquiring diarrhea. Improving sanitation-hygiene behaviors and breastfeeding were believed sufficient to protect from diarrhea.
- Rotavirus diarrhea is an almost unknown disease. After receiving information about rotavirus, it was perceived as a serious disease.
- Concerns regarding rotavirus vaccine included not being on the Indonesian NIP, the "newness" of the vaccine, the potential for adverse events, the cost of vaccine, and the use of trypsin porcine in the vaccine production process.
- Respondents reported the need for more information on rotavirus disease and the vaccine and that further discussion with primary health providers was essential before accepting the vaccine.

administration of ORS. Moreover, improvements in sanitation and hygiene are not sufficient to prevent rotavirus disease; thus, vaccination is the most effective prevention.[7]

Since the vaccine was not listed on the NIP, it was devalued by parents. This was intrinsically linked to the idea that if the vaccine was not listed on the NIP, then the Indonesian government must not consider disease prevention to be essential. This concern was also raised by our HCPs[15] and has been previously reported in connection with other vaccines, such as the pneumococcal vaccine.[19]

Concern regarding newness, safety, efficacy, and the cost of the vaccine were raised by our participants as potential barriers to vaccine acceptance. These concerns have also been cited as significant barriers to the acceptance of other new vaccines.[20,21] Other barriers were halal status and the use of porcine trypsin in the vaccine production process. This issue has been previously reviewed by Grabenstein.[22] For most Muslims in Indonesia, halal status is a significant factor influencing their decision to vaccinate. Both *Rotarix*® and *RotaTeq*® have yet to be certified as halal vaccines by the *Majelis Ulama Indonesia* (MUI), the Indonesian clergy association. Advocacy for the endorsement of new vaccines by Islamic religious organizations should be a critical component of immunization strategy as parents need assurance that the vaccine is halal.[16]

Similar to a findings in a qualitative review by Ames *et al.*,[23] our participants expressed a desire to receive more information about rotavirus disease and the vaccine. Knowledge of the disease and vaccine can help encourage vaccine acceptance. As with previous studies, we found that primary HCPs have an essential role in parental vaccine decisions.[18,24] Clear communication between parents and their trusted HCP can also expedite vaccine acceptance. Most participants reported that they received their information on vaccines from their primary HCPs and that their primary HCPs influenced their decisions. However, the limited time spent discussing the issue of immunization with parents (especially given the tendency to focus on the vaccines listed on the NIP) and the provider's lack of knowledge have been identified as potential barriers in promoting the rotavirus vaccine.[15] Non-NIP vaccines are only available through hospitals or private pediatricians.[25] The limited availability of the vaccine will continue to be a significant barrier for parents who wish to vaccinate their children against rotavirus.

To the best of our knowledge, no previous study has focused on the attitudes of Indonesian parents towards the rotavirus vaccine. Using in-depth interviews to elicit a greater depth of information is a key strength of our work. Our study identified barriers to rotavirus vaccine acceptance. We acknowledge that this result should not be generalized to a broader population due to our study sample's unique characteristics and the limited number of participants. This qualitative study should be complemented with a quantitative study with a representative sample of parents to provide a comprehensive assessment of barriers to the rotavirus vaccine implementation in Indonesia.

In conclusion, pregnant mothers and parents in Yogyakarta, Indonesia were largely unaware of the burden of rotavirus disease and the availability of a vaccine to prevent infection. While they were receptive to vaccinate their children against rotavirus, some key barriers were noted to impact actual vaccination. These barriers included vaccine omission from the Indonesian NIP, as well as the newness, safety and efficacy, cost, and halal status of the vaccine. Information and recommendation from HCPs play an essential role in vaccine acceptance. Discussions regarding rotavirus disease and vaccine availability needs to be conducted with communities, religious leaders, and HCPs.

Conflict of interest

HS has received grant funding for investigator-driven research from bioCSL, GSK, and Sanofi Pasteur.
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CRM has received funding from GSK for investigator-driven research on vaccines.
The other authors have no competing interests to declare.

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Appendix 1.Consolidated criteria for reporting qualitative studies: a 32-item checklist

No.	Item	Guide questions/description	Note
Domain 1: Research team and reflexivity			
	Personal-Characteristics		
1	Interviewer	Which author/s conducted interview?	Interviews were done by SP and two trained and experienced research assistants anthropologist and sociologist
2	Credentials	What were researcher's credentials?	SP: Ph.D., Medical-Anthropologist MN: Ph.D. Pediatrician- public health.
3	Occupation	What was their occupation?	SP and MN were researchers and lecturers at the Faculty of Medicine, UGM, at the time of the study.
4	Gender	Was the researcher male or female?	Both researchers were female.
5	Experience and training	What experience did the researcher have?	Both researchers were trained and had experience in conducting qualitative studies.
	Relationship with participants		
6	Relationship established	Was a relationship established before study commencement?	Before the interview, the participant and the interviewer did not know each other.
7	Participant knowledge of interviewer	What did participants know about researcher?	Information statement regarding the study was offered to potential participants
8	Interviewer characteristics	What characteristics were reported about interviewer?	The interviews were conducted by experienced medical anthropologists and sociologist.
Domain 2: study design			
	Theoretical framework		
9	Methodological orientation and Theory	What methodological orientation was stated to underpin the study?	This study drew on phenomenology as an orientation research methodology.
	Participant selection		
10	Sampling	How were participants selected?	We purposely invited participants identified from the registries of community members.

Appendix 1.Consolidated criteria for reporting qualitative studies: a 32-item checklist (continued)

No.	Item	Guide questions/description	Note
11	Method of approach	How were participants approached?	Participants were initially approached face to face by their midwife, and the research staff made follow-up telephone calls
12	Sample size	How many participants were in the study?	There were 26 participants.
13	Non-participation	How many people refused or dropped out?	None
	Setting		
14	Setting of data collection	Where was data collected?	We conducted interviews in the participants' houses.
15	Presence of non-participants	Was anyone else present?	No observers were present at the time of the interviews.
16	Description of sample	What are the important characteristics of sample?	Participants consisted of 17 mothers, and 9 pregnant women, 20 had completed at least senior high school. Two had vaccinated their child with rotavirus vaccine.
	Data collection		
17	Interview guide	Were questions, prompts, guides provided by authors?	An interview guide was developed based on the literature review. We conducted a weekly team meeting to discuss preliminary findings, and we modified and revised the interview guides as needed
18	Repeat interviews	Were repeat interviews carried out?	We re-contacted 4 participants for various clarification questions.
19	Audio/visual recording	Did research use recording to collect the data?	All interviews were digitally recorded (audio) and professionally transcribed verbatim.
20	Field notes	Were field notes made during and/or after interview?	Field notes were made during or after the interview.
21	Duration	What was duration of interviews?	Each interview was conducted for an average of 45-60 minutes.
22	Data saturation	Was data saturation discussed?	We recruited participants until data was saturated.
23	Transcripts returned	Were transcripts returned to participants?	Transcripts were not returned to participants. However, we conducted paraphrasing during the interviews and debriefing after the interviews.
Domain 3: analysis and findings			
	Data analysis		
24	Number of data coders	How many data coders coded the data?	Two researchers (SP and MN) coded the data.
25	Description of coding tree	Did authors provide a description of coding tree?	N/A (No)
26	Derivation of themes	Were themes identified in advance or derived from data?	We identified themes based on the literature and finalized the thematic framework based on the data
27	Software	What software, if applicable, was used to manage the data?	NA
28	Participant checking	Did participants provide feedback on the findings?	No
	Reporting		
29	Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified?	We presented the participants' quotations to illustrate the findings and give characteristics of the respondents for each quotation.
30	Data and findings consistent	Was there consistency between data presented and the findings?	Yes
31	Clarity of major themes	Were major themes clearly presented in the findings?	We presented mayor themes in the results section.
32	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes, it included in the Results and Discussion.