

The effect of education intervention on caregiver' s knowledge about vaccination in children aged 0-23 months

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The effect of education intervention on caregiver's knowledge about vaccination in children aged 0-23 monthsHannina S. Aisyah^{1,2} and Jaraporn Tangpakdee^{2,*}¹Faculty of Health Sciences, Universitas Muhammadiyah Lamongan, East Java, Indonesia²Faculty of Nursing, Khon Kaen University, Khon Kaen, Thailand*Corresponding author: jurtan@kku.ac.thReceived 25 June 2021
Revised 16 December 2021
Accepted 22 January 2022**Abstract**

The caregivers of children aged 0-23 months are lack of knowledge and information about vaccination which resulting in the low rates of vaccination in Lamongan. The objective of this study was to investigate the effect of education intervention on caregiver's knowledge about vaccination in children aged 0-23 months in Lamongan, East Java, Indonesia. A quasi-experimental design with one group of pretest-posttest without control group design was employed. One hundred and thirty caregivers in one group that fulfilled the inclusion criteria were selected from the Integrated Healthcare Centers (Posyandu) in five villages. The caregivers answered a pretest questionnaire and socio-economic data. After that, they received education about vaccination in children aged 0-23 months using video records and wheel vaccination calendar. Next month on the day of vaccination, a posttest with same question as pretest was administered. The results of the validity research instrument showed that the I-CVI was 0,79. Reliability for measuring caregiver's knowledge about vaccination using KR-20 was 0,83. The statistical analysis was performed by using Paired sample t-Test. The result showed a significant increase in mean \pm SD from 20.69 (\pm 2.58) before intervention to 24.97 (\pm 2.58) after intervention at the level of $p < 0.001$. According to the result of this study, education interventions using video records and wheel vaccination calendars can increase caregivers' knowledge about vaccination in children aged 0-23 months. Future research should be done with a larger number of participants to provide more quality representation. Twenty-three months program to monitor vaccination in each age can be measured for effective education intervention.

Keywords: Caregiver's knowledge, Children, Education Intervention, Vaccination**1. Introduction**

Vaccination is one of the most effective ways to prevent communicable diseases [1]. According to the World Health Organization (WHO), vaccination recently prevents 2-3 million deaths each year. An estimated 19.7 million children under the age of one did not receive basic vaccines [2]. About 4.5 million of South Asia's children missed out on routine vaccination [3]. One of the 10 countries with the highest number of unvaccinated children is Indonesia [4]. According to the Ministry of Health of the Republic of Indonesia, 390,000 or 6.3 % of Indonesian children had not received complete basic vaccination per May 2020 [5].

Vaccines protect against many different diseases including Cervical cancer, Cholera, Diphtheria, Hepatitis B, Influenza, Japanese encephalitis, Measles, Meningitis, Mumps, Pertussis, Pneumonia, Polio, Rabies, Rotavirus, Rubella, Tetanus, Typhoid, Varicella, Yellow fever, and the recent is COVID-19. Some other vaccines are currently under development or being piloted including Ebola and malaria but are not yet available globally [6].

One of the barriers to vaccination was a parents' lack of understanding about vaccination due to the caregiver's lack of knowledge about vaccination in children aged 0-23 months. The caregiver's knowledge about vaccination is very important in increasing vaccination in children [5]. The success of a vaccination program highly depends on the tools to ensure vaccine effectiveness and the readiness of health workers. One effort that

can be done to increase vaccination in children aged 0-23 months is to provide education intervention for the caregiver [7].

Several countries of South-East Asia including Indonesia and Timor-Leste have not solved the poor reliability of published administrative vaccine figures and are depriving programs of the appropriate monitoring tool. As vaccination programs are ready, countries in the area concentrate on issues of safety and control of vaccinations, regular vaccine distribution methods, and a life-cycle vaccine approach. Many countries in the Region have developed innovative strategies to reach high-risk and underserved populations [8].

Factors related to completeness of basic immunization include maternal knowledge, maternal attitudes, family support, health workers' support, and the completion of basic vaccination; however, the dominant factor is maternal knowledge [9]. In a study conducted in Lamongan, Indonesia in 2016, mother's knowledge had proven to be an important factor in increasing vaccination. Mother who has good knowledge will give complete vaccination for her children. Health education about vaccination must develop for a mother who has children so that she can provide complete vaccination. Additionally, parents and family motivation in utilizing healthcare centers were needed to be complete vaccination [10]. Educational intervention was effective in increasing parental knowledge [11]. A short education seminar designed for caregivers had a remarkable effect on their vaccination knowledge [12].

The Health Belief Model (HBM) has been used to develop effective interventions to change health-related behaviors. The HBM could be used to analyze the effect of education interventions on caregiver's knowledge at vaccination in children aged 0-23 months. Besides, parents who think that vaccines are safe are more likely to be influenced by health care providers in making decisions to vaccinate their children when compared to parents who think that vaccines are unsafe [13]. Parental fear is a major obstacle in obtaining the vaccination in children even though the risk of vaccines is lower than the benefits [14]. Community perception and participation in vaccination programs help as a positive reinforcement of parents' perceptions. Parents' attention to vaccine safety occurs in a community context and can be shared by other parents in the same community [13].

In general, individuals tend to have a conformational attitude or are in line with others who are considered important. The influence of the family on the formation of attitudes is very large because the family is the closest person to other family members. Families who have babies or toddlers with complete vaccination status are due to the support of families to provide vaccinations for their babies or toddlers, and families who have infants or toddlers with the most complete vaccination status with family traditions that are accustomed to giving vaccination in infants or toddlers [15].

In conclusion, caregiver's lack of knowledge about vaccination and limited interventions or strategies to boost vaccinations in Lamongan are needed to solve. This study aimed to investigate the effect of education interventions on caregiver's knowledge about vaccination in children aged 0-23 months in Lamongan, East Java, Indonesia.

2. Materials and methods

2.1 Quasi-experimental research

This study performed a quasi-experimental design with one group of pretest-posttest without control group to evaluate the effects of an education intervention for caregivers of children aged 0-23 months. This study was conducted with the cooperation of caregivers of children aged 0-23 months by visiting the integrated healthcare centers (Pesyandu) in Lamongan, East Java, Indonesia. The data were collected from March to April 2021.

2.2 Purposive sampling

The study was conducted in five villages with low vaccination rates and had different vaccination schedules. The villages included A (Jetis Village), B (Sidomukti Village), C (Sukomulyo Village), D (Sukorejo Village), and E (Plosowahyu Village). All the villages were situated in Lamongan regency, East Java province, Indonesia. This study included the caregivers of children aged 0-23 months.

The inclusion criteria were: (1) The caregivers of children aged 0-23 months without vaccination contraindication, (2) The caregivers of children aged 0-23 months who visited five integrated healthcare centers and brought children to vaccination, (3) The caregivers who were willing to participate in this study, (4) The caregivers who were literate in Bahasa Indonesia.

The exclusion criteria were: (1) Caregivers who did not receive complete education intervention, (2) Caregivers who did not complete the intervention and post-test.

2.3 Questionnaire

The socioeconomic data questionnaire was prepared by the researcher to collect the general information of the participants including caregiver's age, educational level, ethnicity, working status, family income, family type, delivery place, decision-maker, marital status, baby's age, children's number, and vaccination experience.

The caregiver's knowledge of vaccination was assessed by the 30 items questionnaire about vaccination. The questionnaire used the Guttman scale with a "true and false" answer. In the Guttman scale, the positive statement type had a value of 1 if it was true and 0 if it was false, and the negative statement applied vice versa. The assessment for the caregiver's knowledge was carried out by one summing up the score of all the correct items of each participant, in which the higher score showed better knowledge. Due to the COVID-19 in these areas, the researchers were not able to access the caregiver's knowledge of vaccine after one month as the plan as it was the highest infection incidence across Indonesia.

2.4 Education intervention

The materials for the education intervention were video recordings and a wheel vaccination calendar. The content of education intervention by video recordings were perceived susceptibility. Perceived severity included by providing prevalence of children who did not receive the vaccine. The prevalence of deaths causes was preventable through vaccination. Perceived benefits included the definition of vaccination, the purpose of vaccination, benefits of vaccination, the diseases prevented by vaccination. Perceived barriers included contraindicated and side effects after received the vaccine. Cues to action included type of vaccination, doses of vaccine, injection site, vaccination schedule in each age, and vaccination service place. Self-efficacy providing information about care for children after a received vaccine, and invitation to give the complete vaccine to children. The content of the wheel vaccination calendar is appropriate for the vaccination schedule in each age of children and the type of vaccine in children aged 0-23 months as well as providing a simple reminder of the date of the next vaccination.

The wheel vaccination calendar is a calendar which invented and innovated by the researcher. The calendar has 2 layers: the first layer with a diameter of 23.8 cm and the second layer can round 360° with a diameter of 18.2 cm blue color is used to mark a week of vaccination for the first year while pink color is used for the second year. The type and date of vaccination are in accordance with vaccination schedule by the Ministry of Health of the Republic of Indonesia. The procedure is started from the birth of the child by marking the blue line according to the month of birth, and then follow the pie chart to find out the vaccination schedule. Next, the red line is used to mark the second year of children's age and the type of vaccine which is appropriate for the child's age.

The calendar contained information about vaccination and is easy for caregiver to understand. It can also be displayed at home to remind caregivers or family members about the vaccination schedule for their child. As well as providing a simple reminder of the date of the next vaccination. The calendar was registered from the Ministry of Law and Human Rights with the application number and date EC00202115276, March 12, 2021. The wheel vaccination calendar already got the certificate from Intellectual Property Indonesia on May 7th, 2021 (Figure 1).



Figure 1 Certificate from intellectual property Indonesia; (A) Indonesia version, and (B) English version.

2.5 Experimental procedures

The caregivers filled in the pretest questionnaire about vaccination coverage and socio-economic data (10 min). After that, they learned about vaccination coverage in children aged 0-23 months using video recordings and the wheel vaccination calendar with an interactive open discussion delivered in Indonesian Language (15 min). In the end, they received a wheel calendar vaccination so that they could display it at home. They also did the post-test questionnaire (10 min). On the next month's day of vaccination, the researcher distributed same questionnaire (posttest assessment). The researcher was unable to obtain the caregiver's knowledge of vaccine after one month as planned due to the presence of COVID-19 in these areas, which had the highest infection rate in Indonesia.

2.6 Validity and reliability

The validity of research instruments was tested by three experts. First, the researcher has tested the two experts in pediatric nursing from the Faculty of Nursing, Khon Kaen University, and one expert from Prince Songkla University. The result of the I-CVI showed 0.79. The researcher tried out the questionnaire to 10 caregivers who had the same characteristics as the research population. Reliability for measuring caregiver's knowledge about vaccination used Kuder - Richardson Formula 20 (KR-20). The reliability of the questionnaire was 0.83.

2.7 Statistical analysis

The data analysis process used Statistical Package for Social Science (SPSS) 23.0 and the data was entered into a personal computer to be analyzed. Descriptive studies like frequency and percentage were used to summarize the socio-economic and caregiver's knowledge of vaccination coverage. Inferential statistics were conducted to find a comparison means between one group pre-and post-intervention using the Paired Sample t-Test.

3. Results and discussion

A total of 130 caregivers were registered and attended the post-test questionnaire. 44.6% of the participants ranged from 21 to 30 years old. For the level of education, the majority of the participants (12) 44.6% were senior high school graduates and 95.4% of them were Javanese. More than a half (53.8%) the participants were unemployed. The majority of them were delivering their children in a private hospital (47.7%). For vaccination experience, most of participants (61.5%) have experienced vaccination as shown in Table 1.

The minimum score of pretest and posttest questionnaires showed 16 and 19. The maximum scores of pre-test was 27 and the post-test was 30 as shown in Table 2. The result showed a significant increase from 20.69 (± 2.58) before intervention to 24.97 (± 2.58) after intervention at the level of $p < 0.001$ as shown in Table 3.

Table 1 Frequency and percentage of participants characteristic (n=130).

Variables		Frequency	Percentage (%)
Age	21-30 Years Old	58	44.6
	31-40 Years Old	40	30.8
	> 40 Years Old	32	24.6
Education Level	Junior High School	24	18.5
	Senior High School	72	55.4
	University	34	26.2
Ethnicity	Javanese	124	95.4
	Non-Javanese	6	4.6
Working Status	Employed	60	46.2
	Unemployed	70	53.8
Family Income	< Rp 1,000,000 (<70 USD)	54	41.5
	Rp 1,000,000 - Rp 2,000,000 (70-140 USD)	52	40.0
	> Rp 2,000,000 (> 140 USD)	24	18.5
Family Type	Nuclear Family	67	51.5
	Extended Family	63	48.5
Delivery Place	Public Hospital	20	15.4
	Private Hospital	62	47.7
	Primary Healthcare	13	10.0
	Midwifery Private Clinic	35	26.9
Decision Maker	Father	118	90.8
	Mother	10	7.7
	Grandmother	2	1.5
Marital Status	Married	123	94.6
	Widowed	7	5.4
Baby's Age	1 month	23	17.7
	2 months	47	36.2
	3 months	60	46.2
Children's Number	First Children	48	36.9
	Second Children	39	30.0
	Third Children	34	26.2
	Fourth Children	6	4.6
	Fifth Children	3	2.3
Vaccination Experience	Yes	80	61.5
	No	50	38.5

Table 2 Total Scoring of Caregiver's Knowledge Questionnaire (n=130).

Minimum Score		Maximum Score	
Pre-Test	Post-Test	Pre-Test	Post-Test
16	19	27	30

Table 3 Mean and SD score of knowledge scores on caregiver's knowledge (n=130).

Variable	Pre-Test	Post-Test	95% CI	t	Mean paired different	df	Sig. instead p-value
	Mean (\pm SD)	Mean (\pm SD)					
Knowledge scores	20.69 (± 2.58)	24.97 (± 2.58)	3.92 to 4.66	-22.83	4.29	129	0.001



Figure 2 Wheel Vaccination Calendar.

This is the first study that used an education intervention in the form of video recordings and wheel vaccination calendar (Figure 2) to improve caregiver's knowledge about vaccination in Lamongan. The result of this study was supported by a previous study in Malaysia with 40.1% of participants were 20–30 years of age [16].

The level of education, majority senior high school with 55.4%. The result showed from the previous study, education level of 60.1% of surveyed caregivers was senior school [12]. More than a half 53.8% the participant was unemployed. The result of this study was supported, the majority of mothers were unemployed [17]. Mostly they were delivered their children in a private hospital with 47.7%. The result from the previous study showed, about 40.0% of the children were delivered to private hospitals [18]. The majority of participants were married with 94.6%. This finding was supported by the previous study conducted in health centers in Ilkosodu based Cross-Sectional study of the mothers who were married [18].

Education Interventions based on the HBM to the effect of an education intervention on caregiver's knowledge about vaccination. The education intervention used video recordings and wheel vaccination calendar. The process of intervention included HBM 6 theoretical elements: perceived susceptibility, perceived severity, perceived benefit, perceived barriers, cues action, and self-efficacy is a form of activity with delivering material education intervention about health aimed at changing target behavior. The content of the wheel vaccination calendar is appropriate for the vaccination schedule in each age of children and the type of vaccine in children age 0-23 months as well as providing a simple reminder of the date of the next vaccination. Educational interventions targeting parents with low levels of education and income are needed. A short educational intervention designed on improving parents' knowledge about childhood immunization in Malaysia and has brought about a significant positive change in their knowledge about childhood immunization [16]. Educational interventions designed for parents can have important implications for improving vaccine uptake. Educating low-literate mothers by using pictorial messages and very simple language improved the completion rates of the DPT-3/Hepatitis B vaccine by 4% [19]. In East China, a study has shown the health education intervention uses a short education seminar focused on improving the vaccination knowledge level of caregivers and made a remarkable increase in their vaccination knowledge [12].

Furthermore, this study found that there is low to moderate-certainty evidence suggesting that face-to-face information or education may improve or slightly improve children's vaccination status, parents' knowledge, and parents' intention to vaccinate. Face-to-face interventions may be more effective in populations where a lack of awareness or understanding of vaccination is identified as a barrier. The effect of the intervention in a population where concerns about vaccines or vaccine hesitancy are the primary barrier is less clear. Reliable and validated scales for measuring more complex outcomes, such as attitudes or beliefs, are necessary to improve comparisons of the effects across studies [20].

4. Conclusion

An education intervention that uses video records and gives wheel vaccination calendar can improve caregiver's knowledge about vaccination in Lamongan. This study demonstrated that providing fifteen minutes of education to caregivers in a Posyandu (Integrate Health Post) is an effective and practical strategy to improve caregiver's knowledge about vaccination in children aged 0-23 months. However, the actual effectiveness of such interventions on immunization rates and status has not been studied. Future research should be done with a larger number of participants to provide more quality of representation and use the wheel

vaccination calendar for children in other age groups to increase the vaccination rate in children in Indonesia. This study has some limitations: (a) a pre-posttest for a single group without a follow-up to determine the real effectiveness of the intervention on vaccination rate and status (b) the finding evaluates only the caregiver knowledge. However, the study generated data about caregivers' knowledge of vaccination in Lamongan thus providing baseline data to improve the vaccination rates. The study findings may not reflect the knowledge of all Indonesian caregivers; rather, they reflect only the knowledge of those who participated in the program. Twenty-three months program to monitor vaccination in each age can be measured for effective education intervention.

5. Ethical approval

Ethical approval was obtained from the Human Research Ethics Committee of Khon Kaen University (No. HE632286) and the Research Department of Lamongan (No.070/273/SKP/413.11/II/2021).

6. Acknowledgements

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