Digital Consultation, Information, and Education to Enhance Knowledge and Attitudes on Hypertension

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ABSTRACT

Background: *Hypertension is a non-communicable disease known as the silent killer. The majority of deaths from stroke and heart attacks worldwide (more than 1000 cases/hour) are caused by hypertension. This study aims to determine the increase in knowledge and attitudes about hypertension after being given an intervention in the form of digital consultation, information, and education (KIE).*
Method: *The study employed a One-group pretest-posttest design with 36 purposively sampled respondents. It took place in Semarang from November 2023 to January 2024. Digital KIE was the intervention, delivered through WhatsApp flyers over 3 days, facilitated by a healthcare professional. Knowledge and attitudes about hypertension were measured, and data analysis utilized the Wilcoxon test.*
Result: *The average age of respondents was 43.2 (±13.6) years, with a majority being female (75%), having a secondary education (58.3%), employed (77.8%), income > regional minimum wage (63.9%), having a family history of hypertension (63.9%), and not suffering from hypertension (75%). Findings from this study revealed an increase in respondents with good knowledge from 69.4% to 94.4% and respondents with a positive attitude from 61.1% to 80.6%. There was a significant difference in knowledge (Δ = 1; p = 0.000) and respondents' attitudes (Δ = 1.5; p = 0.020) after being provided with hypertension intervention using digital KIE. Digital KIE significantly improves knowledge and attitudes about hypertension. The implementation of digital KIE on a larger scale is expected to be a means of preventing hypertension.*

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INTRODUCTION

Hypertension is a non-communicable disease when blood pressure reaches 140/90 mmHg or higher. More than 1000 people per hour die from strokes and heart attacks, with the majority of these deaths caused by hypertension.(1) Hypertension is one of the diseases leading to premature death worldwide. It is considered a silent killer, with 46% of people with hypertension unaware of their condition.(2) Symptoms sometimes include headaches, irregular heart rhythms, nosebleeds, ear ringing, and vision problems. Severe cases can cause nausea, vomiting, confusion, anxiety, muscle tremors, and chest pain. If untreated, hypertension can have serious consequences. Complications can lead to heart attacks, heart failure, irregular heartbeats, and strokes due to blockages or ruptures in the brain's blood vessels.(3)

Globally, around 1.28 billion people aged 30-79 years suffer from hypertension. Seventy percent of these individuals live in low- and middle-income countries (2). According to WHO, approximately 4 out of 5 people with hypertension do not receive adequate treatment. Improving treatment could prevent 76 million hypertension-related deaths from 2023 to 2050.(1)

According to data from the 2023 Indonesian Health Survey (SKI), the prevalence of hypertension among individuals aged 15 and older in Indonesia rose from 25.8% in 2013 to 29.2% in 2023. The highest prevalence was observed in Central Kalimantan Province (38.7%), while the lowest was recorded in the Papua Highlands (19.4%). The data also indicated that hypertension prevalence increases progressively with age. The majority of cases were found among women (32.8%), urban residents (29.7%), individuals from lower-middle economic backgrounds (30.0%), and those with no formal education or schooling (41.3%)(4). In Semarang City, hypertension cases are the highest among non-communicable diseases. The number of cases reported at community health centers in Semarang saw a significant spike from 2017 to 2019, with 8355 cases in 2017, sharply rising to 161,283 in 2018 and 232,189 in 2019. Hospital cases of hypertension also ranked the highest among non-communicable diseases, with 20,148 cases in 2019. Most patients were aged 40-65, with 117,224 cases

at health centers and 12,143 in hospitals. The high incidence of hypertension in this age group may be due to unhealthy lifestyles, such as lack of regular exercise, poor diet, infrequent health check-ups, and smoking.(5) In 2021, hypertension was the top disease in Semarang's community health centers, with 387,196 cases, surpassing respiratory diseases (311,692).(6)

Knowledge of risk factors and the negative impacts of hypertension is crucial for its prevention. However, most people lack sufficient knowledge about hypertension management, including understanding the disease, dietary patterns, medication adherence, medical care, and complications.(7) Even those aware of hypertension may not know management strategies or believe in the effectiveness of prevention methods such as physical activity and reducing salt and alcohol intake.(8) This knowledge gap highlights the need for education on hypertension management.(9)

The use of mobile applications in medical communication has rapidly grown and plays a crucial role in bridging the information gap on hypertension. Digital education can increase awareness, knowledge, and attitudes about hypertension(10), including more cost-effective and efficient management(11),(12). Digital education has been proven effective in improving knowledge, attitudes, and medication adherence for hypertension compared to those not receiving digital education.(13),(14),(15) However, other studies indicate that this does not automatically translate into action against hypertension.

Based on data from the 2022 health profile of Ngemplak Simongan Community Health Center, West Semarang is one of the areas in Semarang City with a high number of hypertension cases, totaling 4338 cases throughout 2019, averaging 361 cases per month. A preliminary study conducted at the end of 2023 in West Semarang showed that 24.3% of 222 respondents had hypertension, and 39.6% had a family history of hypertension. Hypertension education is delivered individually to patients visiting the local community health center (puskesmas). However, community-based empowerment education has yet to be implemented. There is significant potential for community empowerment in this area, supported by the willingness and capability of healthcare workers at the puskesmas. Additionally, nearly all community members own mobile phones, are receptive to new information, and are eager to collaborate, further facilitated by strong signal coverage. This study aims to assess the impact of digital education through WhatsApp groups on enhancing knowledge and attitudes toward hypertension. This study aims to determine the impact of digital education using WhatsApp groups on improving knowledge and attitudes about hypertension.

METHOD

This study is pre-experimental research with a one-group pretest-posttest design approach. The subjects of this study were the community in the West Semarang subdistrict, selected purposefully and meeting the inclusion criteria (having a mobile phone with WhatsApp and being willing to participate as research respondents). The exclusion criteria for this study were respondents who left the WhatsApp group. The study was conducted from November 2023 to January 2024 in Semarang City.

The intervention in this study involved providing digital CIE through two WhatsApp groups, each consisting of 18 respondents and one facilitator. The purpose of creating small groups for the intervention was to make respondents feel more familiar and focused and to ensure all respondents received attention, preventing them from leaving the group. The facilitators in this study were a general practitioner and a nurse in charge of non-communicable disease programs from a community health center in the area. The role of the facilitator was to provide consultation, information, and education, including answering every question from respondents. The materials and media included knowledge about hypertension (definition of hypertension, causes of hypertension, symptoms of hypertension, myths and facts about hypertension, dangers of hypertension, and risk factors for hypertension (the importance of physical activity, dangers of salty snacks, dangers of caffeine consumption, etc.) presented in the form of flyers. The researchers prepared the content and previously discussed it with the facilitators. The intervention was conducted in three sessions provided daily, with the following details: flyer distribution from morning to afternoon and discussions and Q&A sessions in the evening (18:00-21:00).

The variables in this study included respondent characteristics (age, education, occupation, and employment status), knowledge, and attitudes about hypertension. The research instrument was an interview guide. Pretest data was collected after respondent recruitment before the intervention (first day) and after the intervention (third day). Data collection was carried out through interviews. The sample size for this study refers to the design and evaluation of educational research by Frankel et al., which states that the sample size for experimental research is 30 per group.(16) The sample size of 36 in this study was considered sufficient to represent the population.

All collected data were checked for completeness and consistency. The effectiveness of the

intervention was measured by comparing the differences and significance of pretest and posttest data on respondents' knowledge and attitudes. Differences in respondents' knowledge and attitudes about hypertension before and after the intervention were analyzed using the Wilcoxon test in the Statistical Package for the Social Sciences (SPSS) Version 23. The significance criterion in this study was $p<0.05$. This study has obtained approval from the Ethics Committee of the Faculty of Health, Dian Nuswantoro University, with number 001401/UNIVERSITAS DIAN NUSWANTORO/2024.

RESULT AND DISCUSSION

Table 1 presents the characteristics of the respondents in this study. The average age of the respondents is 43.2 years. The majority are female (75%), have medium education (58.3%), are employed (77.8%), have an income above the regional minimum wage (63.9%), have a family history of hypertension (63.9%), and do not suffer from hypertension (75%).

Table 1. Distribution of frequency characteristics of respondents

Variables	n	%
Gender		
Female	9	25
Male	27	75
Education		
Low	7	19.4
Medium	21	58.3
High	8	22.2
Occupation		
Employed	28	77.8
Unemployed	22.2	2.1
Income		
< Regional Minimum Wage	13	36.1
> Regional Minimum Wage	23	63.9
History of hypertension		
Yes	23	63.9
No	13	36.11
Hypertensive		
Yes	9	25
No	27	75
Total	**36**	**100**

Table 2. Frequency distribution of respondents' knowledge before and after the intervention

No	Statement	Pretest		Posttest	
		True	False	True	False
		f (%)	f (%)	f (%)	f (%)
1	Blood pressure of 180/90 is a symptom of hypertension	35 (97)	1 (03)	35 (97)	1 (03)
2	Hypertension causes complications, such as heart disease	36 (100)	0 (00)	35 (97)	1 (03)
3	Hypertension is not a hereditary disease	25 (69)	11 (31)	22 (61)	14 (39)
4	Physical activity is beneficial for individuals with hypertension	28 (78)	8 (22)	32 (89)	4 (11)
5	Exercise can cause complications in individuals with hypertension	27 (75)	9 (25)	34 (94)	2 (06)
6	Swimming is safe for individuals with hypertension	18 (50)	18 (50)	27 (75)	9 (25)
7	Fast food is recommended for individuals with hypertension	31 (86)	5 (14)	33 (92)	3 (08)
8	Preserved foods can cause hypertension	28 (78)	8 (22)	36 (100)	0 (00)
9	Excessive consumption of instant noodles can increase blood pressure	30 (83)	6 (17)	35 (97)	1 (03)
10	Coffee consumption can raise blood pressure within 3 hours.	25 (69)	11 (31)	28 (78)	8 (22)
11	Drinking two cups of coffee daily can regularly increase blood pressure	30 (83)	6 (17)	31 (86)	5 (14)
12	Individuals with hypertension do not need to avoid coffee	31 (86)	5 (14)	33 (92)	3 (08)
13	Noncompliance with hypertension medication increases the risk of complications (stroke, heart, kidney disease, etc.)	33 (92)	3 (08)	35 (97)	1 (03)
14	Hypertension cannot be cured	13 (36)	23 (64)	18 (50)	18 (50)
15	Hypertension medication is taken only when feeling dizzy	28 (78)	8 (22)	30 (83)	6 (17)

Table 3. Frequency distribution of respondents' attitudes before and after the intervention

No	Statement	Pretest				Posttest			
		SD	D	A	SA	SD	D	A	SA
		f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
1	In my opinion, individuals with hypertension do not need to check their blood pressure when feeling dizzy.	0 (0.0)	3 (8.3)	29 (80.6)	4 (11.1)	0 (0.0)	2 (5.6)	22 (61.1)	12 (33.3)
2	In my opinion, individuals with hypertension should rest when trying to prevent a rise in blood pressure.	0 (0.0)	2 (5.6)	29 (80.6)	5 (13.9)	1 (2.8)	0 (0.0)	28 (77.8)	7 (19.4)
3	In my opinion, individuals with hypertension should regularly check their blood pressure to prevent complications.	0 (0.0)	0 (0.0)	23 (63.9)	13 (36.1)	0 (0.0)	0 (0.0)	17 (47.2)	19 (52.8)
4	In my opinion, individuals with hypertension do not need to exercise regularly.	0 (0.0)	4 (11.1)	28 (77.8)	4 (11.1)	1 (2.8)	2 (5.6)	27 (75.0)	6 (16.7)
5	In my opinion, individuals with hypertension should participate in aerobic exercises to maintain stable blood pressure.	0 (0.0)	2 (5.6)	29 (80.6)	5 (13.9)	1 (2.8)	2 (5.6)	28 (77.8)	5 (13.9)
6	In my opinion, cycling is good for individuals with hypertension.	0 (0.0)	11 (30.6)	23 (63.9)	2 (5.6)	0 (0.0)	8 (22.2)	23 (63.9)	5 (13.9)
7	In my opinion, there is no issue with individuals with hypertension frequently eating chips.	0 (0.0)	10 (27.8)	26 (72.2)	0 (0.0)	0 (0.0)	8 (22.2)	23 (63.9)	5 (13.9)
8	In my opinion, individuals with hypertension should avoid fast food.	0 (0.0)	2 (5.6)	27 (75.0)	7 (19.4)	0 (0.0)	0 (0.0)	23 (63.9)	13 (36.1)
9	In my opinion, individuals with hypertension do not need to limit their consumption of instant noodles.	1 (2.8)	3 (8.3)	28 (77.8)	4 (11.1)	1 (2.8)	5 (13.9)	23 (63.9)	7 (19.4)
10	In my opinion, individuals with hypertension should reduce their coffee consumption.	0 (0.0)	1 (2.8)	30 (83.3)	5 (13.9)	0 (0.0)	0 (0.0)	29 (80.6)	7 (19.4)
11	In my opinion, healthy individuals should limit coffee consumption to maintain normal blood pressure.	0 (0.0)	0 (0.0)	30 (83.3)	6 (16.7)	0 (0.0)	1 (2.8)	22 (61.1)	13 (36.1)
12	In my opinion, individuals with hypertension who enjoy drinking coffee should regularly check their blood pressure.	0 (0.0)	4 (11.1)	29 (80.6)	3 (8.3)	1 (2.8)	0 (0.0)	24 (66.7)	11 (30.6)
13	In my opinion, individuals with hypertension should take their medication regularly.	0 (0.0)	1 (2.8)	31 (86.1)	4 (11.1)	1 (2.8)	1 (2.8)	25 (69.4)	9 (25.0)
14	In my opinion, taking medication regularly can help individuals with hypertension prevent an increase in blood pressure.	0 (0.0)	1 (2.8)	28 (77.8)	7 (19.4)	0 (0.0)	2 (5.6)	21 (58.3)	13 (36.1)
15	In my opinion, it is not a problem if individuals with hypertension do not take their medication regularly.	0 (0.0)	1 (2.8)	25 (69.4)	10 (27.8)	0 (0.0)	2 (5.6)	20 (55.6)	14 (38.9)

Note : SD=Strongly disagree; D=Disagree; A=Agre; SA=Strongly agree

Table 4. Distribution of frequency of respondents' knowledge and attitudes before and after the intervention

Variable	Pretest		Posttest	
	n	%	n	%
Knowledge				
High	25	69.4	34	94.4
Low	11	30.6	2	5.6
Attitude				
Positive	22	61.1	29	80.6
Negative	14	38.9	7	19.4

Table 5 presents the impact of the intervention on respondents' knowledge and attitudes after the intervention. There is a very significant difference in knowledge (Δ=1.0; p=0.000) and a significant difference in respondents' attitudes (Δ=1.5; p=0.020) about hypertension after the intervention.

Table 5. Impact of intervention on respondents' knowledge and attitudes

Variable	Median (Min-Max)	Difference in Values	P-value
Knowledge			
Pretest	12 (8-15)	1.0	0.000
Posttest	13 (9-15)		
Attitude			
Pretest	45 (40-56)	1.5	0.020
Posttest	46,5 (38-59)		

This study aims to understand the impact of digital CIE (Communication, Information, and Education) on knowledge and attitudes about hypertension. The main findings of this study indicate an increase in knowledge (p=0.000) and attitudes (p=0.020) about hypertension after participating in three educational sessions through a WhatsApp group. This is supported by the increased percentage of respondents with good knowledge (69.4% to 94.4%) and positive attitudes (61.1% to 80.6%) after the intervention.

Using digital applications is an effective strategy as it allows for the integration of health service information. Digital applications have been used as interventions for various non-communicable diseases. Studies on the preference for using social networks as health communication development among hypertension patients have been conducted in Brazil(17) and Ecuador(18), showing that WhatsApp is the most favored medium for receiving and asking for information related to hypertension. Utilizing digital applications offers several benefits, including cost-effectiveness, reducing long-term complications of hypertension, and improving the quality of life for hypertension patients.(19) This was also observed in this study, where the intervention media used was the WhatsApp application, which is already familiar and used daily by respondents to support their activities. Most respondents in this study are of productive age, have a secondary education, work, and have an income above the minimum wage. This condition reflects that using digital applications, including seeking health information, is common. Furthermore, the study location is in Semarang City, where the availability of internet signals supports the use of digital devices.

Initially, only 69.4% of respondents had high knowledge about hypertension, indicating a lack of knowledge among respondents. Generally, the public has inadequate knowledge about hypertension, affecting their behavior (attitudes and practices), as found in previous studies conducted in Ghana(20) and Saudi Arabia.(21)

After the intervention, the number of respondents with high knowledge about hypertension increased to almost 100%. Similarly, positive attitudes increased to 80.6%. This study demonstrates a significant difference in the score of knowledge and attitudes after the intervention using WhatsApp, with Δ=1; p=0.000 and Δ=1.5; p=0.020, respectively. These findings align with previous studies on interventions using social media. Elzeky et al. reported increased knowledge in blood pressure measurement after 24 educational sessions of 1 hour each for nurses.(22) Similar studies showed increased knowledge and attitudes after conducting anti-smoking campaigns virtually.(15) Another study by Block et al. also proved significant knowledge improvement in blood pressure measurement after 30 minutes of online education.(23) These various intervention descriptions show that online education effectively increases knowledge and attitudes related to hypertension. The WhatsApp application allows systematic and repeated information presentation, direct consultation with facilitators, and interaction among members, making respondents interested in the presented material.(24)

A study by Rakesh et al. showed that public awareness of hypertension prevention and control is better among urban residents living in organized and clean areas than in slums.(25) This theory applies to this study, conducted in an organized and clean urban area. Another reason is that the majority of respondents have a family history of hypertension (63.9%), and 25% are hypertension patients. Although a person's risk factors for hypertension are not related to knowledge about hypertension,(26) this study shows otherwise. Observations during the study indicated that respondents actively communicated in the

WhatsApp group by asking questions and clarifying educational messages in the flyers or sharing experiences. Some questions were related to the definition of hypertension, causes of hypertension from dietary aspects, symptoms of hypertension, behaviors that can cause hypertension, hypertension medication, and hypertension during pregnancy. Most respondents acknowledged that this intervention was beneficial for expanding their knowledge about hypertension. This illustrates that respondents have high awareness to learn more about hypertension to prevent and control it.

Health facilitators are professionals in health services who assist doctors in providing health services. The role of the facilitator in the intervention replaces health services at health facilities. Facilitators serve as liaisons, knowledge intermediaries, trainers, clinical/practical facilitators, and research facilitators,(27) significantly and effectively improving practice processes and care outcomes.(28) This study involved a WhatsApp group's general practitioner and a non-communicable disease program nurse. According to Waters et al., the primary responsibility of a credible, expert, skilled, and trustworthy facilitator is to be a resource to motivate change.(29) The competence of doctors and nurses as facilitators in this study positively contributed to the respondents' activeness during the intervention process. The respondents' trust in the facilitators is due to their competence and experience in medical practice.(30), (31) This demonstrates the facilitators' contribution to the success of the intervention in this study.

CONCLUSION

Interventions involving consultation, information, and digital education (KIE) have significantly improved respondents' knowledge and attitudes toward hypertension. This finding highlights the potential of digital technology as an effective alternative for disseminating hypertension-related information to the public, especially for individuals who may face barriers in accessing traditional healthcare services. By leveraging technology, this intervention can reach a wider audience more efficiently, providing easy access to essential information for the prevention and management of hypertension. The results of this study are expected to foster the development of more innovative educational methods aimed at improving both knowledge and attitudes within the community regarding hypertension. Such efforts contribute to prevention and enhance awareness of the importance of early detection and appropriate management of hypertension.

To maximize the effectiveness of future research, the researchers recommend expanding the study's scale by including a larger sample, incorporating a control group, tailoring educational materials to local needs and characteristics, and conducting ongoing evaluations of the use and impact of digital KIE.

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Conflict of Interest

The authors declare that there's no conflict of interest.

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