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Interactive Media to Increase Family Support and Medication Adherence in Hypertension Patients

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Abstract

Background: Failure to comply with antihypertensive medication risks more serious complications. Researchers examined interactive media to increase compliance with hypertension sufferers effectively.
Methods: The research was carried out with a case-control design. The research sample was taken using non-probability sampling, namely 50 people in the intervention group and 50 in the control group. Before the intervention was carried out, all respondents underwent initial measurements. The final measurement was carried out approximately 1.5 months after the intervention. Bivariate analysis used the Mann-Whitney test and Wilcoxon Signed Rank Test. To analyze the effectiveness of interactive media using the N-Gain Score test.
Results: After the intervention, there were significant differences between the intervention and control groups regarding knowledge (p=0.000), family support (p=0.000), and compliance with hypertension sufferers (p=0.000). There was an increase in compliance in both the intervention and control groups, but the increase in the intervention group was higher. Based on the N-Gain Score test, in the intervention group, there was an increase in knowledge of 75.04%, family support of 64.36%, and compliance of 75.63%. Meanwhile, in the control group, the increase in knowledge was 34.60%, family support 32.84%, and compliance 19.38%.
Conclusions: Interactive media effectively increases hypertension sufferers' knowledge, family support, and compliance.

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INTRODUCTION

Along with the development in Indonesia with all its implications, disease patterns have also changed. The problem of epidemics is not only focused on infectious diseases, but the problem of non-communicable diseases is increasing and is becoming a very heavy burden for society and the government. Basic Health Research data in 2018 showed that the main indicators of non-communicable diseases have increased, including the prevalence of hypertension in the population aged 18 years and over increasing to 34.1%, from previously only 25.8% (Kementerian Kesehatan RI, 2019).

Basic Health Research in 2018 showed that the hypertension rate in Indonesia as measured by measurements at the age of 18 years and over was 34.11%, in Jambi Province it was 28.99%. (Kementerian Kesehatan RI, 2019). Meanwhile, in 2023 the hypertension rate in Indonesia will decrease to 30.8% in Jambi Province 23.6%. The incidence of hypertension in urban and rural areas is not much different, in urban areas it is 31.3% and in rural areas it is 30.1% (Kementerian Kesehatan RI, 2023). Regular use of antihypertensive drugs is important for people with high blood pressure to control hypertension. Nationally, in 2023, the number of hypertension sufferers who received treatment education will be 65.8% and of that number, only 46.7% will receive regular treatment. Meanwhile, in Jambi Province, of the 71.9% who received education, only 44% regularly took medication.(Kementerian Kesehatan RI, 2023).

Discontinuation of treatment will sooner or later result in an increase in blood pressure to levels before the start of antihypertensive treatment. Irregular use of antihypertensive drugs can lead to more serious complications, including resistant hypertension, congestive heart failure, stroke, kidney failure, vision problems, and atherosclerosis. (Gikunda & Gitonga, 2019);(Gardezi et al., 2023);(Hamrahian et al., 2022);(Liu et al., 2023);(Choudhry et al., 2022). In this context, routine treatment for hypertension sufferers is very important. Regular treatment behaviour is closely related to a person's compliance with the recommended or prescribed treatment protocol.

In the opinion of experts, patient non-compliance with treatment is caused by many things, including lack of understanding of the benefits of treatment, lack of motivation, lack of knowledge (understanding and awareness about hypertension), lack of clear guidelines, lack of clear instructions, and patient-health worker communication which is less than optimal, lack of information about treatment, lack of family support, and disease factors (duration, symptoms, severity) (Lukito, 2019). The factors that determine patient compliance are multifactorial but can be grouped into five main areas, including socioeconomic factors, health system factors, disease-related factors, health-related factors, treatment factors, and patient factors. Lack of adequate knowledge about the nature of the disease, symptoms, complications and treatment methods as well as false beliefs about the disease are important factors causing non-adherence to treatment (Hamza et al., 2019); (Satish et al., 2021); (Soesanto et al., 2021);(Win et al., 2021). Research conducted in the Pudak Payung Community Health Center working area, Semarang City, shows that there is a significant relationship between the level of knowledge, perception of health services, motivation for treatment, family support and the compliance of hypertension patients in carrying out the treatment process. (Ihwatun et al., 2020)

Despite extensive research on medication adherence and the identification of factors that predict changes in medication adherence, there is insufficient evidence to suggest that any type of strategy or intervention is the most appropriate strategy. With so many factors potentially influencing non-compliance, specific interventions that combine various strategies are needed. In a systematic review of hypertension adherence interventions, Gwadry-Sridhar and colleagues found that 12 of 25 (40.8%) education-based strategies improved adherence to antihypertensive medication (Choudhry et al., 2022).

The problem of non-compliance is universal and not limited to developed or developing countries. However, the impact may be greater in countries with limited resources, as low adherence to treatment poses a major challenge in improving public health and

leads to underutilization of essentially limited treatment resources. (Hamza et al., 2019). In reality, in community health centers, with limited time and many patients, the staff finds it difficult to explain and motivate each patient. One way to overcome this problem is by using appropriate health education facilities.

The media's function, besides conveying messages, is also to motivate participants (Jannah & Arini Murni, 2019). Interactive media is an alternative strategy to achieve the goal of providing health education to hypertension sufferers. Interactive media is designed by combining video, animation and Power Point material, including explanations about hypertension, the importance of regular health checks, a balanced diet, physical activity, and treatment of hypertension and its complications which are well-designed and fun. so that it can arouse patient interest and motivation to undergo treatment. Apart from that, interactive media also allows users to freely repeat material they do not understand because it is equipped with questions and answers related to material about hypertension.

The Health Profile of East Tanjung Jabung Regency in 2020 shows that the estimated hypertension disease in East Tanjung Jabung Regency is 55,383 people (24.10%) and in the Dendang Community Health Center it is 3,973 people (24.10%), of this number the average is only 12. 76% receive health services, but there is no data regarding the number of sufferers who routinely receive treatment. (Dinas Kesehatan Kabupaten Tanjung Jabung, 2021).

Based on the description above, the researchers examined the influence of the use of interactive media on knowledge, family support, and treatment compliance in hypertension sufferers. The problem raised in this research is the low level of compliance of hypertensive patients in undergoing treatment. The general aim of this research is to determine the effectiveness of interactive educational media in increasing knowledge, family support and compliance in hypertension sufferers undergoing treatment in the Dendang Community Health Center working area, East Tanjung Jabung Regency.

METHODS

Participant characteristics and study design

The sample selection criteria were that they had received treatment at a health facility, were aged between 20 and 65 years, and were willing to be respondents. The research design uses a quasi-experimental design with a non-randomized pre-test and post-test control group, where respondents are divided into 2 groups and all receive treatment/intervention. Before the intervention a measurement was carried out (pre-test) and after the intervention, a measurement was also carried out (post-test).

This research model can be described as follows:

O1 ---------- X1 ---------- O2
O1 ---------- X0 ---------- O2

Figure 1. Research design

Sampling and data collection procedures

The study population was hypertensive patients, based on PIS-PK survey data at the Dendang Community Health Center. In this study, the sample was determined using non-probability sampling, namely 50 people in the intervention group and 50 control people who met the specified criteria. The sample criteria used were: age 20 – 65 years, able to read and write, respondent or family member has a smartphone/android, able to communicate. Primary data regarding the identity and characteristics of respondents as well as knowledge, family support and compliance were collected through home visits to conduct interviews with respondents using prepared questionnaires. Primary data collection was carried out by interviewers who had been previously trained. Meanwhile, secondary data was obtained from the Dendang Community Health Center, East Tanjung Jabung Regency. The instrument used is a questionnaire which includes knowledge, family support, and compliance. To measure compliance using the MMAS-8 scale. The MMAS-8 has been validated and used in various countries (Chung et al., 2015). Each question will receive a score from seven dichotomous scale questions, and one Likert scale question. From

the scoring method, three compliance values will be obtained, namely the calculation that obtains a score of 8 which is classified as high compliance, a score of 6 – < 8 is included in the moderate compliance category and a score of < 6 is included in the low compliance category (Morisky et al., 2008).

The research was carried out after obtaining approval from the Health Research Ethics Committee of The Health Polytechnic of Jambi with Description of Ethical Exemption No.LB.02.06/2/48/2023, and research permission from the Regional Research and Development Agency of East Tanjung Jabung Regency No.360/57 /Balitbangda/2023. Besides that, data collection for each respondent was carried out after obtaining formal permission from the respondent in the form of informed consent.

Initial measurements.

Before the intervention was implemented, those appointed as respondents were first measured for their level of knowledge, family support and compliance using a prepared questionnaire.

Intervention

The intervention carried out was in the form of a short lecture and the provision of interactive media. The interactive media used is an Android-based application which contains material about hypertension in the form of videos, booklets, blood pressure categories, and measuring compliance categories. This interactive media application was created by an information technology consultant based on input and materials from researchers. The intervention group received short lectures and provided Android-based applications as interactive media, while the control group received intervention in the form of lectures.

Final measurements

This measurement was carried out approximately 1.5 months after the intervention, with the assumption that within 1.5 months the community would be able to understand the material contained in interactive media and had undergone several treatments/controls. The instrument used for measurement is the same as the instrument used in the initial measurement.

Data analysis

This research data analysis includes univariate analysis and bivariate analysis. Univariate analysis was used to describe the characteristics of respondents, while bivariate analysis was used to analyze the variables of knowledge, family support and compliance. To carry out analysis of knowledge, family support, and compliance using the "t-test" if the data is normally distributed and if the data is not normally distributed, the Mann-Whitney test is used for independent samples and the Wilcoxon Signed Rank Test for paired samples. Meanwhile, to analyze the effectiveness of interactive media using the N-Gain Score test.

RESULTS AND DISCUSSIONS

This research was conducted on hypertension sufferers in the Dendang Community Health Center working area, East Tanjung Jabung Regency from March to July 2023. The research was conducted in Rantau Indah Village as a control group and in Sidomukti Village as an intervention group. The research location is a rural area where the geographical and socio-cultural conditions of the residents of the two villages are almost the same. Apart from that, access to health services in these two villages is relatively easy.

Description of respondent characteristics

As can be seen in Table 1, the majority are women, with a female gender composition of 33 people in the intervention group (66%) and 36 people in the control group (72%). Most of the respondents were over 45 years old. In the intervention group aged 46 - 55 years there were 17 people (34%) and in the group aged 56 - 65 years, there were 31 people (62%). Meanwhile, in the control group, there were 25 people aged 46-55 years (50%) and 20 people aged 56-65 years (40%).

Overall, the education level of respondents in the intervention group was almost the same as the control group. In the intervention group, the majority of respondents had an elementary school education 30 people (60%). meanwhile, in the control group, 37 people had elementary school education (74%).

Most of the respondents were housewives in both the intervention and control groups. In

the intervention group, there were 32 people (64%) and in the control group, there were 33 people (66%).

In the intervention group, the majority of respondents only discovered they had hypertension under 3 years, 21 people (42%), and in the 3 - 6 year period, 20 people (40%). Meanwhile, in the control group, 15 people (30%) had suffered from hypertension for less than 3 years and 15 people (30%) had suffered from hypertension for 3 - 6 years. Most respondents had been treated for hypertension for less than 3 years, 25 people (50%) in the intervention group, while in the control group, 23 people (46%) had been treated for less than 3 years.

Table 1 Characteristics of respondents in the intervention group and control group

Characteristics	Intervention group		Control group	
	n	%	n	%
Gender				
Female	33	66	36	72
Male	17	34	14	28
Age group				
< 35 years old	0	0	1	2
36 – 45 years	2	4	4	8
46 – 55 years	17	34	25	50
56 – 65 years	31	62	20	40
Level of education				
Not completed in primary school	17	34	17	34
Elementary School	13	26	20	40
Graduated First High School	11	22	9	18
High school graduate	6	12	3	6
Graduated College	3	6	1	2
Work				
Indonesian republican army and Indonesian republican police	0	0	2	4
Employee	1	2	2	4
Retired	3	6	1	2
Trader	3	6	2	4
Farmer	6	12	9	18
Day Worker	3	6	0	0
Doesn't work	2	4	1	2
Housewife	32	64	33	66
Long time suffering from hypertension				
< 3 years	21	42	15	30
3 - 6 years	20	40	15	30
7 - 10 years	5	10	6	12
> 10 years	4	8	14	28
Length of treatment for hypertension				
< 3 years	25	50	23	46
3 - 6 years	17	34	12	24
7 - 10 years	4	8	2	4
> 10 years	4	8	13	26
Total	50	100	50	100

Description of Knowledge, Family Support, and Compliance Before and After Intervention in the Intervention and Control Groups

Before the intervention, all respondents' knowledge was low, both in the intervention and control groups. However, after the intervention, in the intervention group, it increased to 44% in the medium group and 56% in the high group, while in the control group, this figure increased to 28% in the medium group. Respondents' family support before the intervention was mostly low, namely 76% in the intervention group and 70% in the control group. However, after the intervention was carried out, the intervention group increased to 100% in the high category, while in the control group, it increased to 42% in the medium category and 44% in the high category.

Table 2 Knowledge, Family Support and Compliance Before and After Intervention in the Intervention Group and Control Group

Variable	Intervention group		Control group	
	n	%	n	%
Knowledge				
Before Intervention				
Low	50	100	50	100
Moderate	-	-	-	-
High	-	-	-	-
After Intervention				
Low	-	-	36	72
Moderate	22	44	14	28
High	28	56	-	-
Family support				
Before Intervention				
Low	38	76	35	70
Moderate	11	22	14	28
High	1	2	1	2
After Intervention				
Low	-	-	7	14
Moderate	-	-	21	42
High	50	100	22	44
Compliance				
Before Intervention				
Low	50	100	50	100
Moderate	-	-	-	-
High	-	-	-	-
After Intervention				
Low	10	20	41	82
Moderate	32	64	9	18
High	8	16	-	-
Total	50	100	50	100

Respondents' adherence to treatment, both in the intervention and control groups, was relatively low. After the intervention, the intervention group's compliance changed to the medium category of 64% and the high category of 16%. Meanwhile, in the control group, this figure increased to 18% in the medium category and none in the high category.

Bivariate Analysis

Differences in Knowledge, Family Support and Compliance between the Control Group and the Intervention Group

Based on the results of the normality test, all variables have a non-normal distribution. Because the data is not normally distributed, the difference test uses the Mann-Whitney

test for independent samples. Based on the Mann-Whitney difference test, there was no significant difference in respondents' knowledge between the intervention group and the control group (p = 0.876), there was also no significant difference in family support between the intervention group and the control group before the intervention (p = 0.695). Likewise, regarding respondent compliance between the intervention group and the control group, there was no significant difference before the intervention (p = 0.836).

After the intervention was carried out with group counselling and provision of interactive media, knowledge, family support and compliance between the control group and the intervention group there were significant differences (p = 0.000), as seen in Table 3 below.

Table 3 Differences in Knowledge, Family Support and Adherence between Control Group and Intervention Group

	Group	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Knowledge before intervention	Intervention	50,09	2504,50	0,876
	Control	50,91	2545,50	
Family Support Before Intervention	Intervention	51,60	2580,00	0,695
	Control	49,40	2470,00	
Compliance Before Intervention	Intervention	49,91	2495,50	0,836
	Control	51,09	2554,50	
Knowledge after intervention	Intervention	74,72	3736,00	0,000
	Control	26,28	1314,00	
Family Support After Intervention	Intervention	69,57	3478,50	0,000
	Control	31,43	1571,50	
Compliance After Intervention	Intervention	72,39	3619,50	0,000
	Control	28,61	1430,50	

Differences in Knowledge, Family Support and Compliance, Before and After Intervention in the Control Group and Intervention Group

To test differences between paired samples, the Wilcoxon Signed Rank test was used because the distribution was not normal. Based on the Wilcoxon Signed Ranks test, there was a significant difference (p-value = 0.000) in knowledge, family support and compliance, between before and after the intervention, both in the control group and the intervention group.

Table 4 Differences in Knowledge, Family Support and Adherence between Before and After Intervention in the Control Group and the Intervention Group

	Differences			Asymp. Sig. (2-tailed)
	Negative	Positive	Constantly	
Control Group				
Knowledge before and after intervention	0	49	1	0,000
Family support before and after intervention	0	48	2	0,000
Compliance before and after intervention	0	36	14	0,000
Intervention Group				
Knowledge before and after intervention	0	50	0	0,000
Family support before and after intervention	0	50	0	0,000
Compliance before and after intervention	0	50	0	0,000

Effectiveness of Intervention in the Control Group and Intervention Group

To determine the effectiveness of the intervention implemented, the N-Gain Score test was carried out. Gain Score is categorized into 3 types, namely: effectiveness is "low" if the score is < 0.3, "medium" if the score is 0.3 - 0.7 and "high" if the score is > 0.7. Based on the calculation of the N-Gain Score test (Table 5) in the control group, the increase in knowledge was only 34.60, including the moderate category, the increase in family support showed a mean value of 32.84, including the "medium" category, and the effectiveness of increasing compliance was

19.38, including the "moderate" category. low". The N-Gain score in the intervention group increasing knowledge was 75.04, which was "high", the N-Gain score for family support was 64.36, which was in the "medium" category, and the N-Gain score for increasing compliance was 75.63, which was in the "high" category.

Table 5 Intervention Effectiveness in Control Group and Intervention Group

	N-Gain Percentage		
	Min	Max	Mean
Knowledge			
Control Group	0,00	66,67	34,60
Intervention Group	50,00	85,71	75,04
Family support			
Control Group	0,00	66,67	32,84
Intervention Group	50,00	88,89	64,36
Compliance			
Control Group	0,00	66,67	19,38
Intervention Group	40,00	100,00	75,63

The statistical analysis results showed no significant differences between the control group and the intervention group on baseline measures of knowledge, family support, and treatment adherence. The intervention results showed increased knowledge, family support, and compliance in the intervention and control groups. The statistical test results showed significant differences before and after the intervention, both in the control and intervention groups.

The intervention carried out increased respondents' knowledge in both the control and intervention groups. However, intervention with interactive media in the intervention group provided better results (mean = 75.04) than the control group (mean = 34.60), and there was a significant difference in knowledge between the intervention group and the control group after the intervention (p-value = 0.000).

The interactive media used contains text, visual, and audio elements. The more senses are used to convey the message, the more knowledge is absorbed. The use of tools or media in carrying out health promotion will help a lot in conveying clearer messages to individuals or society. Apart from that, interesting media will increase self-confidence, and maximize cognitive, emotional and psychomotor abilities when facing health problems (Dinatha, 2019);(Dewi & Caesar, 2022);(Zulaekah et al., 2023). Family support in both the control and intervention groups also increased after the intervention. However, family support in the intervention group (mean 64.36) was better than family support in the control group (mean 32.84). Based on the results of the Mann-Whitney test, there was a significant difference in family support in the intervention group and the control group (p-value = 0.000).

Judging from the level of compliance, the increase in compliance in the intervention group (medium = 64%, high = 16%) was much better than the control group (medium = 18%). Likewise, it can be seen from the average compliance value after intervention in the intervention group, 75.63 in the control group, 19.38. Therefore, it can be said that group counseling accompanied by the provision of interactive media is effective in increasing knowledge, family support, and respondent compliance. However, if you look at the average N-Gain score of 75.04 for knowledge and compliance reaching 75.63, this achievement is high. For family support, which reached 64.4, it is in the medium category.

Factors identified as influencing nonadherence include socioeconomic factors, healthcare system-related factors, disease-related factors, therapy-related factors, and patient-related factors.(Kvarnström et al., 2021);(Satish et al., 2021);(Putra, 2022);(Aljofan et al., 2023). Arindari's research (2020) shows that there is a statistically significant relationship between perceived susceptibility to hypertension complications, perceived severity of hypertension complications, perceived benefits of medication adherence, perceived

barriers to medication compliance, and medication compliance (Arindari & Suswitha, 2020). The level of knowledge is one of the factors that can influence a person's compliance with treatment. When knowledge about the disease is sufficient, patients will be motivated to seek treatment. Treatment adherence behavior in patients requires knowledge and skills.(Kvarnström et al., 2021);(Soesanto et al., 2021);(Hamrahian et al., 2022). Patient health education via multimedia can significantly increase medication adherence and these results are better than conventional education (Bijani et al., 2020).

By increasing respondents' knowledge, this can encourage increased compliance. Research by Haeruddin et al. (2021) shows that there is a relationship between family support (p = 0.003), level of knowledge (p = 0.007) and treatment compliance in patients with hypertension. Family support is the attitude and actions of family acceptance towards family members in the form of informational support, assessment support, instrumental support and emotional support. Family support plays a role in motivating sick family members, thus encouraging patients to continue to think positively about their illness and comply with recommended treatment (Haeruddin et al., 2021). This family support includes: reminding and taking people for treatment to the health centre, reminding them to take medication, listening to complaints during treatment, giving encouragement, and reminding them about their diet.

The interactive media provided is a learning medium to convey messages to those who watch, read or listen. If viewers, readers and listeners understand the content of interactive media, then they will be encouraged to behave according to what is expected in interactive media.

Interactive media can be accessed using a computer or smartphone. In this study, interactive media was accessed using a smartphone, and the results showed an increase in hypertension sufferers' compliance during treatment. This is in line with research by Fadilah et al., which shows that mobile-based health interventions effectively control blood pressure and improve medication adherence in hypertensive patients (Fadilah et al., 2020). The study by Masnah et al. in Jambi City also showed that interactive media can increase family support and compliance in hypertension sufferers (Masnah et al., 2023). Of course, the patient's family will also see the interactive media given to hypertension sufferers. The patient's family will understand what hypertension sufferers should do by viewing interactive media. This is what encourages families to do something about family members who suffer from hypertension, whether in the form of reminders, warnings, encouragement, or actions to help patients undergo the hypertension treatment process. This is in accordance with Suhat's research, which shows that after health education, there is a significant increase in family support for hypertension sufferers , as well as Presilia's research, which states that there is a positive relationship between knowledge and family support (Presilia et al., 2020).

In this study, 50 people (100%) stated that their family behavior had changed positively in supporting hypertension sufferers. Family support for hypertension sufferers in the intervention and control groups was quite good, but positive changes in the control group were lower, namely 96%. This finding is supported by other research showing that good family support is associated with better blood pressure control (Chacko & Jeemon, 2020). Other studies found a significant relationship between family support and medication adherence in hypertension sufferers (Ihwatun et al., 2020) (Shahin et al., 2021).

The average compliance score of 6.79 is quite good because the ideal score is 8. This may be because the evaluation time (final measurement) is only around 1.5 months, so it does not provide enough time to understand hypertension better. In addition, most of the respondents were over 45 years old and had an elementary school education. Of course, this understanding is quite difficult to achieve optimally. Apart from that, achieving positive behavioral changes takes a long time. However, this shortcoming can be offset by good group counseling/guidance. Therefore, support and other communication media are needed to motivate and encourage hypertensive patients

to comply more with treatment. Social media can be informative and inclusive so that people can easily receive information about high blood pressure and can facilitate increased awareness about hypertension treatment. Integrating social media into hypertension management may improve patient lifestyle and medication adherence compared to traditional approaches (Saputra et al., 2022). Several strategies that can be implemented to increase medication adherence in chronic disease patients include increasing patient understanding of the benefits of treatment and using health information technology to improve decision-making and communication during and after treatment in health facilities. Most patients have suffered from hypertension for less than 3 years. This condition is almost the same as when treatment was carried out. This shows that hypertension sufferers know about their disease through examination results at health facilities. They sought treatment at a health facility because of the complaints they experienced. Therefore, early detection through home visits is very important. In this way, people with hypertension can be identified before their condition gets worse. Even though accessing health facilities is not difficult, most do not follow the correct treatment process. There is an implicit hypothesis that early detection of hypertension through screening reduces the burden of disease and mortality, but this hypothesis has not been tested in rigorous studies (Schmidt et al., 2020).

Treatment adherence is a "behavior". Behavior change is not easy and requires a long process and time. Several documents show that efforts that can be made to increase compliance include: simplifying treatment regimens, effective communication between staff and patients, involving support staff/assistants, providing health education/counseling, social encouragement/support, providing incentives for compliance and increasing hours service.

Self-management is also important in improving compliance. As shown in Putri's (2021) research, which states that the factor that has the most influence on self-care compliance and health status after being controlled by confounding variables is self-management. (Putri et al., 2021). Self-management includes several concepts such as self-care, autonomy, persistence, healthy behavior change, patient education, and collaborative care, which aim to educate patients about their illness so that they take a more active role in therapy.

CONCLUSION

The interactive media used for effective intervention increases the compliance of hypertension sufferers during treatment. However, increasing medication compliance in hypertension sufferers is also helped by increasing knowledge and family support. Considering the results of this research, the use of interactive media should be carried out by paying attention to regional conditions and the community's social conditions. For further research, it would be best to conduct a cohort study to evaluate the sustainability of changes in compliance and other factors that influence these changes.

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