

# HASIL CEK\_Saputri, Sari, Akrom\_Compliance, Counseling, Diabetes, Medication-taking behavior, Short messages

*by Saputri, Sari, Akrom Modified Brief Counseling-5a, Motivational Sms*

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## Modified brief counseling-5A, motivational SMS on medication-taking behavior and compliance among diabetic patients

Ginanjar Zukhruf Saputri<sup>1</sup>, Okta Muthia Sari<sup>2</sup>, Akrom Akrom<sup>1</sup>

<sup>1</sup>Department of Clinical Pharmacy, Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

<sup>2</sup>Department of Clinical Pharmacy; Faculty of Math and Science, University of Lambung Mangkurat, Kalimantan, Indonesia

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### ABSTRACT

Knowledge of diabetes mellitus (DM) management can improve adherence in medication-taking behavior. Counseling by pharmacists is believed to contribute to its better acquisition. Nevertheless, many counseling and reminder media are still currently developed. This study aimed to identify the effects of brief counseling-5A modification and a motivational reminder through short message services (SMS), designed with religious approach, on medication-taking behavior and adherence among DM outpatients at Jetis 1 Community Health Center, Bantul, Yogyakarta, Indonesia. This quasi-experimental study employed a pretest-posttest control group design. Data were collected prospectively from May to August, 2018. There were 72 patients who met the inclusion criteria divided evenly into two groups, the treatment group and the control group. The data collected by interviews using questionnaires on medication-taking behavior and the medication adherence rating scale (MARS) and were statistically assessed using the Wilcoxon test. The results showed that brief counseling-5A, combined with religious motivational SMS, raised the stage of behavior change in DM patients. There were increases ( $\Delta$ ) in medication-taking behavior by  $2.76 \pm 1.59$  and patient compliance by  $3.44 \pm 3.45$ . In conclusion, brief counseling-5A by pharmacists and motivational text reminders can improve the medication-taking behavior and compliance of DM patients with the therapy.

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#### Corresponding Author:

Ginanjar Zukhruf Saputri

Department of Clinical Pharmacy, Faculty of Pharmacy, Universitas Ahmad Dahlan

Jl. Prof. DR. Soepomo Sh, Warungboto, Umbulharjo, Yogyakarta, Indonesia

Email: zukhruf.alparslan@gmail.com

### 1. INTRODUCTION

The International Diabetes Federation (IDF) states that, in 2015, up to 415 million people from the age range of 20-79 years suffered from diabetes mellitus (DM), and 10 million of them were Indonesian [1]. DM management comprises lifestyle modification, regular drug administration, routine doctor visits as part of health control [2]. The ultimate purpose is to control blood glucose levels and improve the quality of life of DM patients [3], [4]. However, blood sugar control may not be optimal because of several factors, including inadequate knowledge and low medication adherence [5].

Previous studies have shown that counseling by pharmacists significantly shapes the outcome of the treatment of diabetes mellitus patients [5]–[8]. Previous study claims that brief counseling by pharmacists can help to improve medication-taking behavior and adherence to medication. It also improve the quality of life among DM-hypertensive patients [9]–[12].

Thakkar *et al.* suggest that in addition to counseling, sending short messages to patients with chronic diseases can raise their compliance from 50 to 67.8% (17.8% increase). Also, the other advantages are that short message services (SMS) is easy to use and can deliver information immediately with unlimited coverage [13]. Brief counseling-5A is a modified model of brief counseling by pharmacists. Combined with a text reminder to hypertensive patients, it has been reported to exhibit a positive outcome, that is, improved quality of life [9], [10]. A further investigation in Saputri *et al.* reveals that the levels of behavior of the treatment group 1 (brief counseling-5A) and treatment group 2 (brief counseling-5A+motivational short message services (SMS)) have more significant proportions (21.2% each) than that of the control group (12.1%) [9]. For the reasons above, brief counseling by pharmacists and motivational reminder via SMS positively contribute to the successful treatment of hypertensive diabetic inpatients. Nevertheless, there is still a lack of research on both types of intervention at community health centers.

In Indonesia, primary medical care serves as the first destination of referral for, among others, DM patients and is offered in level-1 facilities, such as community health centers. According to the Health Profile of Bantul Regency, diabetes is included in the top 10 diseases at the community health centers and the number of visits has increased compared to the previous year [3]. Jetis 1, Bantul community health center showed the higher visit rates for diabetic patients. The high number of patient visits causes time constraints in the interaction between patients and the pharmacy. Based on the American Diabetes Association (ADA) [4], diabetic patients are patients who need to be counseled by pharmacists regarding their treatment. Brief counseling is recommended in implementing health behavior change counseling in primary health facilities such as community health centers. Therefore, a study of brief counseling by pharmacists, together with motivational reminders via text messages, for DM outpatients at community health centers becomes necessary. This study develops the brief counseling-5A model and combines it with motivational SMS. Aside from diabetes mellitus and its treatment, counseling incorporates religious aspects. Through a systematic review, Darvyri *et al.* propose that religion or religiosity contributes to the efficacy of type-2 diabetes treatment as it helps in achieving better blood glucose control [14].

## 1

## 2. RESEARCH METHOD

This study has been approved by the Ethics Committee of Ahmad Dahlan University (KEP UAD) with EC No. 011802025. It employed a quasi-experimental technique, particularly randomized pretest-posttest design with control and treatment groups. The control group underwent the usual care, while the treatment group received brief counseling-5A and motivational SMS. The data were collected prospectively and by filling out the questionnaires and health assessment sheets.

### 2.1. Instruments

The content of the brief counseling-5A model was redeveloped for DM patients and to incorporate a religious approach. It refers to a previous study on brief counseling-5A for Patients with DM-Hypertension [9]. The modified brief counseling-5A was a pharmaceutical intervention that was delivered in a focus group discussion (FGD). In this study, the questionnaire on medication-taking behavior was developed from a previous study, i.e., Saputri *et al.* by adjusting the content to the research subject, namely DM patients. The next step was validity testing by experts like doctors, pharmacists, and clinical psychologists [9].

The questionnaire on medication-taking behavior measures the cognitive, affective, and psychomotor domains of patients in the treatment. Correct answers were scored with +1, whereas the wrong ones were assigned with 0. As for questionnaire item No. 12, score 0 meant "yes", while 1 represented "no, never". The measurement results were then categorized into several stages of change in medication-taking behavior, namely pre-contemplation, contemplation, preparation, and action.

The validity and reliability tests of the first questionnaire, i.e., medication-taking behavior, involved 41 patients who had met the inclusion criteria. The former produced  $r$  count  $> 0.308$  for each question, while the latter yielded Cronbach's alpha of 0.738. Meanwhile, the second questionnaire that measured patient compliance adopted the medication adherence rating scale (MARS). Involving 25 in-patients with diabetes mellitus, Alfian and Putra analyze the validity and reliability of the MARS questionnaire and produce  $r$  count ranging from 0.682 to 0.829 ( $r > 0.396$ ) and Cronbach's alpha of 0.803 ( $\geq 0.70$ ). In other terms, the two sets of questionnaires are valid and reliable for the measurement of medication-taking behavior and compliance among DM patients [15].

The reminder was a modified short message from the one used in Saputri *et al.* and Adikusuma, with the addition of religious content [9], [16]. The researchers sent it by SMS or WhatsApp messenger (WA) for one month (30 days) every morning or evening to remind patients to take their medication on time. Modification on the content of the motivational text was reviewed by doctors, pharmacists, and clinical psychologists.

## 2.2. Subjects

The research subjects who had fulfilled the inclusion criteria were evenly divided into two groups, namely the control group (receiving the usual care from the pharmacists at the community health center) and the treatment group (receiving brief counseling-5A and motivational SMS from the researchers). The inclusion criteria were outpatients at Jetis 1 community health center aged 18 years old and diagnosed with type 2 DM with or without comorbidities during the research period. Also, they had to receive at least one oral anti-diabetic drug in the past three months, have and be able to use mobile phones (read and reply to messages), and be willing to participate in the research by signing an informed consent form. Meanwhile, the exclusion criteria were pregnancy and hearing impairment. Some patients were categorized as lost to follow-up due to incomplete participation, withdrawal from the study, and death.

The control group underwent the usual care from the pharmacists at the community health center. Meanwhile, the treatment group received the modified brief counseling-5A and motivational reminder in the form of short messages. Before (pretest, first meeting) and after (posttest, second meeting) these treatments, the medication-taking behavior and compliance of the respondents were assessed.

## 2.3. Statistical analysis

The validity test used Pearson's correlation coefficient. Hence, the reliability (consistency) test was based on Cronbach's alpha. The Wilcoxon test was employed to identify the presence or absence of shifts in the stages of medication-taking behavior before and after the intervention (significant  $p < 0.05$ ) as well as quantify the average scores of patient's medication-taking behavior and compliance.

## 3. RESULTS AND DISCUSSION

A total of 72 patients met the inclusion criteria and were randomly divided into two groups, namely control ( $n=36$ ) and treatment ( $n=36$ ). However, only 34 patients in the treatment group participated until the end of the research, whereas the other two were categorized into lost to follow-up as they were outside the study site.

The demographic characteristics of these respondents are presented in Table 1. The majority of the patients in the treatment group were  $\leq 55$  years old (61.1%), whereas those in the control group were mostly  $> 55$  years old (69.4%). In both groups, women were dominant, i.e., 75% in the control group and 72.2% in the treatment group. Most respondents undertook  $\leq 12$  years of education, and a large proportion of them was unemployed. Almost all respondents had comorbidities but no family history of DM. In the treatment group, more than half of the patients had a history of DM for  $\leq 5$  years (58.3%). On the contrary, 52.8% of the respondents in the control group had to deal with DM for  $> 5$  years. A higher number of patients in both groups practiced glucose/carbohydrate diet and had exercise habits.

Brief counseling by pharmacists was delivered depending on the assessment results of the respondents' condition, i.e., stages of behavior change. The average time of the brief counseling was  $27.84 \pm 6.78$  minutes (mean  $\pm$  SD). Sending the SMS means supporting said counseling, which took place in categorically limited time. Also, the SMS contained motivational reminders that helped patients to remember taking their medicine while receiving encouragement to continue the treatment.

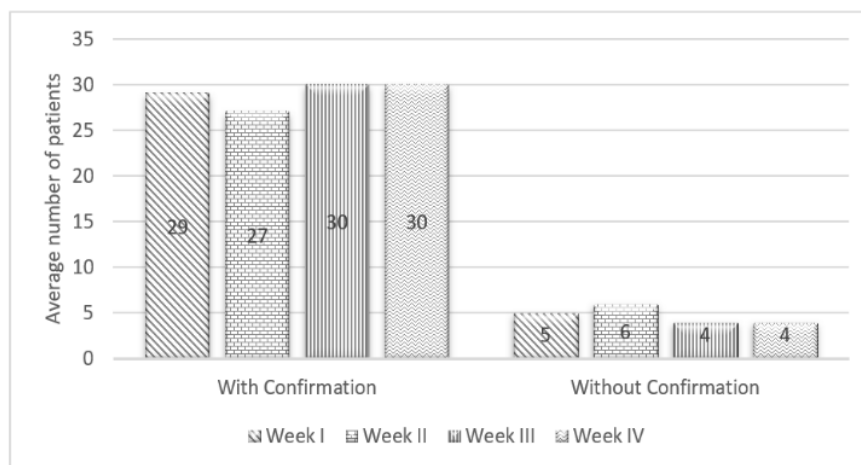
Short messages were sent for approximately 30 days, with the following details: sent daily for the first two weeks and, then, every three days in the next two weeks. A total of 18 patients received motivational text via WhatsApp messenger, while the other 16 patients via SMS. After receiving short messages, patients were encouraged to confirm. The average number of those who did is presented in Figure 1.

The above graph shows that most patients responded to motivational text reminders. In the second week, in which the short messages were sent daily, the number of received confirmations decreased from 29 to 27 patients. On the contrary, in the third and fourth weeks, this number did not experience any decrease. In other words, all patients in the third week continued to confirm that they had received the text reminders that were sent every three days until the last week. The time that they took to reply was around 20-120 minutes.

Based on Mann Whitney's analysis results, there was no statistically significant difference in the number of confirmations between the motivational text reminders sent every day and every three days ( $p > 0.05$ ). It indicates that the total confirmation received in Week I-II and Week III-IV is categorically similar. Based on this, the level of patient response between giving motivational reminder messages both when giving motivational reminder messages every day, and every three days can be taken into consideration in the preparation of intervention media in future studies. It is still necessary to develop an intervention model such as an e-reminder application based on a mobile health application that can practically show the patient's response.

2  
Table 1. The characteristics of diabetic patients in the control and treatment groups

No	Characteristics	Control group		Treatment group		
		Frequency	Percentage (%)	Frequency	Percentage (%)	
	Total	36	100	36	100	
1	Age	≤55 years old	11	30.6	22	61.1
		>55 years old	25	69.4	14	38.9
2	Gender	Male	9	25	10	27.8
		Female	27	75	26	72.2
3	Education	≤12 years	33	91.7	29	80.6
		>12 years	3	8.3	7	19.4
4	Occupation	Employed	14	38.9	17	47.2
		Unemployed	22	61.1	19	52.8
5	Comorbidity	Yes	27	75	23	63.9
		No	9	25	13	36.1
6	Family history of DM	Yes	16	44.4	18	50
		No	20	55.6	18	50
7	Duration of DM	≤5 years	17	47.2	21	58.3
		>5 years	19	52.8	15	41.7
8	Anti diabetic oral	Monotherapy	22	61.1	17	47.2
		Combination	14	38.9	19	52.8
9	Exercise	No	24	66.7	29	80.6
		Yes	12	33.3	7	19.4
10	Diet glucose/carbohydrat	No	3	8.3	10	27.8
		Yes	33	91.7	26	72.2
11	Body mass index	<25 kg/m <sup>2</sup>	24	66.7	19	52.8
		≥25 kg/m <sup>2</sup>	12	33.3	17	47.2
12	Medication-taking behavior	Mean±SD 8.78±2.29		8.12±1.98		
13	Compliance	Mean±SD 22.17±2.76		20.83±3.3		
14	Fasting blood sugar level	Mean±SD (mg/dL) 192.84±75		188.41±65.57		



Notes: a) Week I: the short messages were sent daily, b) Week II: the short messages were sent daily, c) Week III: the short messages were sent every three days, d) Week IV: the short messages were sent every three days, e) Total: 34 patients

Figure 1. The number of diabetic patients who confirmed after receiving motivational reminders from May to August, 2018

One of the processes in brief counseling-5A is assessment, which involves assessing the condition of patients to determine their level of readiness to behavior change. Brief counseling by pharmacists was delivered based on the stage of transformations in medication-taking behavior. ACPM (2009) proposes four steps of behavior change, namely pre-contemplation, contemplation, preparation, and action. After brief counseling by pharmacists, the target patients were expected to a step-up to the next stage, as well as a higher level of medication-taking behavior [17]. The steps of behavior change of the control and treatment groups are summarized in Table 2.

Modified brief counseling-5A, motivational SMS on medication-taking ... (Ginajar Zukhruf Saputri)



Table 2. The stages of behavior change of diabetic patients belonging to the control and treatment groups as observed in the first (pretest) and second (posttest) meeting

Stage of behavior change	Pretest		Post test		p-value
	N	%	N	%	
<b>Control group</b>					
Pre-contemplation	30	83.3	29	80.6	0.773
Contemplation	1	2.8	3	8.3	
Preparation	4	11.1	4	11.1	
Action	1	2.8	0	0	
<b>Intervention group</b>					
Pre-contemplation	32	88.9	10	27.8	0.000**
Contemplation	3	8.3	0	0	
Preparation	1	2.8	13	36.1	
Action	0	0	11	30.6	

The Wilcoxon test; a decrease in behavior change in 4 respondents, a constant stage in 28 respondents, and an increase in 4 respondents. p-value: the significance between the pretest-posttest results of each group; (\*\*) marks a significant difference

The Wilcoxon test revealed that the stages of change in medication-taking behavior varied among the patients in the control group. As many as four respondents showed a decrease, 28 patients did not experience any changes in their behavior, and another four respondents exhibited an increase. Based on the test results, there were no significant shifts (neither increase nor decrease) in the stage of behavior change in this group ( $p>0.05$ ). This finding is in line with Muslimin [12]. Combining brief counseling by pharmacists with motivational text reminders theoretically encourages improvement in patient's medication-taking behavior. The different behaviors that the patients exhibited in the first and second visits are presented in Table 3.

Table 3. The score of medication-taking behavior of diabetic patients as observed in the first (pretest) and second (posttest) meeting

Groups	Pretest	Posttest	$\Delta$ mean of posttest-pretest	p-value
Control	8.78 $\pm$ 2.29	8.81 $\pm$ 2.03	0.02 $\pm$ 1.66	0.744
Treatment	8.11 $\pm$ 1.94	10.88 $\pm$ 1.22	2.76 $\pm$ 1.59	0.000**

The Wilcoxon test results, the data are presented in mean $\pm$ SD

p-value: the significance between the pretest-posttest results of each group; (\*\*) marks a significant difference

The Wilcoxon test of the control group proved that the scores of medication-taking behaviors measured in the pretest and posttest were insignificantly different ( $p>0.05$ ). Accordingly, the patients included in this group exhibited no behavior improvement. On the contrary, the treatment group showed a significant increase in behavior between the pretest and the posttest ( $p<0.05$ ). This outcome is potentially caused by brief counseling-5A that has led to an increase in knowledge or understanding of proper treatment. Notoatmodjo [18] believes that, theoretically, behavior change through the process of knowledge transformation is followed by attitudes and, then, behavior change. Moreover, Swaroop *et al.* have reported that counseling by pharmacists can improve patients' knowledge about the disease and its treatment and, consequently, affect the attitudes, as well as practices, of said patients toward the disease [8].

As a conclusion, the medication-taking behavior score of patients significantly increases after receiving modified brief counseling-5A and motivational text reminders. In other terms, these interventions positively affect diabetes treatment. An increase in medication-taking behavior can shape overall patient compliance with treatment. The patient compliance, as measured with the MARS questionnaire, is presented in Table 4 [9].

Table 4. The scores of compliances with drug administration procedure among DM patients as measured using the MARS questionnaire in the first (pretest) and second (posttest) visits

Groups	Pretest	Posttest	$\Delta$ mean of posttest-pretest	p-value
Control	22.17 $\pm$ 2.76	22.86 $\pm$ 2.60	0.69 $\pm$ 2.09	0.744
Treatment	20.83 $\pm$ 3.31	24.18 $\pm$ 1.73	3.44 $\pm$ 3.45	0.000**

The Wilcoxon test results, the data are presented in mean $\pm$ SD

p-value: the significance between the pretest-posttest results of each group; (\*\*) marks a significant difference

The Wilcoxon test results proved that the compliance scores between the first and second visits were insignificantly different ( $p>0.05$ ). It indicates the absence of an increase in patient adherence. Conversely, in the treatment group, the pretest and posttest scores were significantly different ( $p<0.05$ ), meaning that the patient adherence to medication improves.

These results correspond with several previous studies. For instance, providing brief counseling and motivational text reminders to patients with chronic diseases has been reported to positively improve adherence to medication [12], [19]. Also, brief counseling by pharmacists has been confirmed as an effective method of increasing patient compliance. Furthermore, sending motivational text reminders can raise patients' awareness and, by proxy, adherence [19].

With the pill count, the percentage of compliance was obtained as shown in Table 5. Pill count was conducted after the intervention was completed (i.e., posttest). This technique measures patient compliance with medication and offers an objective result as a part of its advantages. Based on the pill count, there were differences in patient compliance with medication. Patients possibly still had several anti-diabetic drugs from the previous month (before the research), which then affected the compliance score measured in the following month (during the research). Meanwhile, based on the MARS questionnaire, patients showed improved compliance with medication after receiving brief counseling by pharmacists and motivational text reminders. This finding confirms that pharmacists play a crucial role in the treatment of diabetic patients.

Table 5. The compliance (%) of DM patients with medication based on pill count in the first (pretest) and second (posttest) visits

	Control group	Treatment group	p-value
Mean percentage of patient compliance with medication	69.64±27.66	83.63±16.59	0.096

The Wilcoxon test results, the data are presented in mean±SD

p-value: the significance between the mean percentages of patient compliance in the two groups

This study reveals that the provision of brief pharmacist counseling accompanied by a motivational reminder message can contribute to the treatment of diabetes mellitus patients. Motivational text reminder messages sent via WhatsApp (WA) or SMS can improve treatment behavior and medication adherence in the treatment group ( $p < 0.05$ ). However, the results of the matching between the level of adherence based on the MARS questionnaire with the physical amount of the drug (pill count) are still a limitation in this study, indicated by the  $p$ -value  $> 0.05$ .

The role of pharmacist education based on text messages using either the WA or SMS platform shows one of the educational models that is quite affordable in terms of cost and give the impact on adherence level [20], [21]. This is in line with Haider research [22]. It showed that text message-based education is effective in improving DM management, both lifestyle management and medication adherence. In the other hands, pharmacist counselling also improve controlling blood sugar level and increase the quality of life of diabetic patients [10]. Further research is needed regarding the development of pharmacist intervention models related to educational media and digital literacy-based medication reminder messages. Opportunities in using smartphone apps-based e-health showed that they are quite effective in managing DM patients, especially increasing compliance [23], [24].

Education related to lifestyle, both medication adherence, diet management, is needed in the management of diabetes mellitus [25]. Several factors such as low adherence, inadequate support and motivation in the disease management, can contribute to uncontrolled blood glucose levels of patients [26]. The intervention in the form of technology-based education is considered to be able to improve diabetes therapy management. One of them is m-health education based on text messages. The provision of a text message-based reminder intervention showed that it was able to increase the adherence of DM patients, this is in line with the research of Arao *et al.* [26], [27].

The other factors that influence medication adherence are perception of illness, health literacy, self-efficacy and psychosocial factors, both personal and cultural beliefs. This is associated with the aspect of religiosity [28]. In this study, a motivational message was given which included a religious message. Lifestyle settings in the form of diet in the management of diabetes mellitus are associated with religious, family, psychosocial, financial and personal factors. The ADA states that the dietary management of DM patients also takes into account the culture of the population and religion. Although in the study of Katsaridis Savvas *et al.* it showed that Muslims and Christians did not show significant differences regarding adherence to dietary behavior management [25]. Research related to religious coping conducted by Maguna Made *et al.* showed that there was a significant relationship between religious coping and medication adherence also quality of life [29]. Based on this data that religious motivational messages can contribute to medication adherence and management of the lifestyle or behavior of DM patients.

The provision of repeated interventions such as reminder messages and educational messages was shown to be more effective in increasing compliance and changing behavior. Li [30] showed that patient compliance was higher in the group that was given the SMS reminder intervention five times per week than three times per week. In addition, patient-centered care (PCC) recommend several things to improve patient

therapy adherence, including increasing understanding of health literacy, simplifying therapy (avoiding polypharmacy), communication and motivation from health workers, increasing social support, and maximizing the use of technology in educational interventions and reminders [31].

#### 4. CONCLUSION

The combination of modified brief counseling-5A by pharmacists and motivational text reminders containing religious aspect triggers a positive transformation ( $\Delta$ ) in the stage of behavior change (by  $2.76 \pm 1.59$ ) and compliance of DM patients with medication (by  $3.44 \pm 3.45$ ). For this reason, such combination plays a positive role in diabetes therapy management. The study suggests that patient counselling using religious and motivational aspect provided by pharmacists may help improve patient's management about the disease and influences the patient's medication adherence and improving glycemic control and prevention of further complications of the disease.

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## BIOGRAPHIES OF AUTHORS







**Ginanjar Zukhruf Saputri**    is a lecturer in Pharmacy Faculty of Universitas Ahmad Dahlan, Indonesia. She has interest research topics about clinical pharmacy, social and community pharmacy, especially about development of pharmaceutical care intervention such as counseling method using Brief Counseling 5A, and improving adherence of medication using reminder and motivational messages in hypertension and Diabetes Mellitus patients. She can be contacted at email: [zukhruf.alparslan@gmail.com](mailto:zukhruf.alparslan@gmail.com).



**Okta Muthia Sari**    is a lecturer in Pharmacy Study Program of Faculty of Mathematics and Natural Sciences, Lambung Mangkurat University, Banjarbaru, Indonesia. She has interest topics about social and community pharmacy, also clinical pharmacy. Her research about development of counseling method, adherence of medication and quality of life of hypertension and diabetes mellitus patient. She can be contacted at email: [muthiaoktasari@gmail.com](mailto:muthiaoktasari@gmail.com).



**Akrom Akrom**     is a lecturer in Pharmacology and Clinical Pharmacy on Faculty Pharmacy, Universitas Ahmad Dahlan, Indonesia. His interest research topics are about immunopharmacology, pharmacoepidemiology biomelecular, and about evidence based medicine. He also focused on pytomedicine immunopharmacology, chemopreventive immunopharmacology, health technology asesment and medication error in the hospital and primary health care, the development of pharmaceutical care intervention method for chronic disease (asthma, hypertension, diabetes, COPD, and HIV-AIDS), and about survey on smoking as a risk factor for chronic diseases. He can be contacted at email: akrom@pharm.uad.ac.id.

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