A Comparative Study to Enhance Medication Adherence: Pillbox vs Medication Reminder Chart

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Abstrak

The main problems in geriatric patients with type 2 diabetes mellitus are polypharmacy and poor medication adherence, that can lead to increased morbidity and mortality. This study aims to find out the comparison of the effectiveness in the application of *pillbox* versus *medication reminder chart* in improving medication adherence among geriatric patients with Type 2 Diabetes Mellitus. The design of this study is Experimental, randomized controlled trial-pre test-post test control group design. The study subjects were geriatric patients with type 2 diabetic mellitus, conducted by random application technique. The study complied with all clinical research requirements in accordance with the Declaration of Helsinki. Ethics committee approval was obtained from UIN Alauddin Makassar. The instrument used in the form of questionnaires to measure patient's medication adherence using MMAS-8 and WHOQOL-BREEF to measure patients' quality of life that has been tested for validity and reliability. The result shows that *pillbox* can improve medication adherence (P=0,03) and improve quality of life (P=0,60), WHOQOL-BREEF questionnaire score of patients with pill box intervention was increased 13.7619 while WHOQOL-BREEF questionnaire score of patients with medication chart intervention was increased 1.1402. The *pillbox* is the best tool in improving medication adherence and quality of life among geriatric patients with type 2 diabetic mellitus.

Keywords: *pillbox, medication reminder chart, geriatric, type 2 diabetic mellitus*

Backgrounds

Over a period of almost five decades (1971-2019), the percentage of Indonesia's elderly population has about doubled. In 2019, the percentage of the elderly reached 9.60 percent or about 25.64 million people (BPS, 2019). The increase in the number of elderly will have an impact on various aspects of life, especially health. The elderly population will biologically experience the aging process, namely a decrease in the structure and function of cells, tissues, and organ systems and experience homeostasis disorders characterized by decreased physical endurance, so they are more susceptible to certain diseases. One of the homeostasis that is disrupted is the system of regulating blood glucose levels.

Disruption of the blood glucose regulatory system results in an increase in blood glucose more than normal. This condition occurs with age, so many elderly are at risk of developing Type 2 Diabetes Mellitus (DMT2) (IDF, 2021). DMT2 can cause various complications such as microvascular disorders (retinopathy neuropathy and nephropathy) as well as macrovascular disorders (ADA, 2020). This condition causes the elderly to take a lot of drugs (polypharmacy). Polypharmacy is defined as the routine use of 4 or more over-the-counter, prescription and/or traditional medicines by patients, at the same time (WHO, 2017). Polypharmacy causes increased side effects and drug interactions were associated with increased morbidity, mortality and patient care costs (ADA, 2020). Polypharmacy must be monitored properly and closely, followed by good compliance from patients in order to achieve success in treatment.

Functional decline of the body in the elderly, such as decreased cognitive function (easy to forget) becomes one of the factors that affect poor medication adherence. The interventions that can be given by pharmacists to help patients improve compliance in taking drugs are *pillbox* and *medication reminder chart*.

Method

This is an experimental randomized controlled trial - pre test-post test control group design conducted on DMT2 geriatric patients in Kimia Farma Sungguminasa, Gowa-South Sulawesi in June - July 2019.

Thirty three subjects divided into three groups: pillbox, medication reminder chart and control group. The study meets all clinical research requirements in accordance with the Helsinki Declaration. The subjects were recruited based on inclusion and exclusion criteria. Inclusion Criteria are Patients over the age of ≥ 65 years (geriatrics), Patients who have moderate and low compliance seen from the MMAS 8 score, Patients who have never used medication reminder charts and pillbox, and are willing to sign informed consent. Exclusion criteria are patients who died in the middle of research and drop out.

Measurements of the level of treatment were conducted before and after treatment using the MMAS-8 and WHOQOL-BREEF questionnaires in Bahasa versions that had been tested for validity and reliability with a value of Cronbach's Alpha >0.70.

Result and Discussion

33 patients who had met the inclusion and exclusion criteria, consisting of 11 patients in the pillbox group, 11 patients in the medication reminder chart group, and 11 patients in the control group. The characteristics of the subjects were tested using *Chi-Square* and obtained a value of P> 0.05. This showed that there was no difference in the proportion of each variable between the treatment and control groups prior to intervention.

Table I. Characteristics Patients

Characteristics	Pillbox n (%)	Medication Reminder Chart n (%)	Control n(%)	P value
Gender				
Male	3 (27)	2 (19)	1 (9)	0.823
Female	8 (73)	9 (81)	10 (91)	
Age				
65-70 y.o	8 (73)	8 (73)	9 (81)	
71-75 y.o	3 (27)	3 (27)	2 (19)	0.061
Education				
Elementary	9 (81)	10 (91)	10 (91)	
Junior High School	1 (9)	2 (19)	2 (19)	0.518
Senior High School	1 (9)	1 (9)	0 (0)	
Occupation				
Occupied	1 (9)	1 (91)	0 (0)	0.833
Not Occupied	10 (91)	10 (91)	11 (100)	
DM				
< 5 years	3 (27)	3 (27)	3 (27)	
≥ 5 years	8 (73)	8 (73)	8 (73)	0.055
Medication				
< 4	1 (9)	1 (91)	0 (0)	0.833
≥ 4	10 (91)	10 (91)	11 (100)	
Adherence				
Low	8 (73)	8 (73)	9 (81)	0.773
Moderate	3 (27	3 (27	2 (19)	

According to (Ministry of Health of the Republic of Indonesia, 2014) if the age of a person suffering from DM is 65-74 years, the proportion of TGT (Interrupted Glucose Tolerance) of patients is increasing, then patients aged 65-74 or the geriatric category are more susceptible to diabetes mellitus compared to those in the geriatric category. >65 years. Increasing age also causes changes in carbohydrate metabolism and changes in insulin release which is influenced by glucose in the blood and inhibits the release of glucose into cells because it is influenced by insulin. Age affects the risk of developing diabetes mellitus, so it can be said that the increasing age of a person, the more prevalence and impaired blood glucose tolerance in the body (Brunner and Suddarth. 2014). Age factors affect the decline in all body systems, including the endocrine system. Increasing age causes insulin resistance conditions which result in unstable blood sugar in the body so that the number of DM occurrences is one of them due to the aging factor which degeneratively causes a decrease in body function. Characteristics of research subjects indicate that T2DM is more common in female geriatric patients, this is related to a large body mass index and menstrual cycle syndrome and menopause which results in easy accumulation of fat which results in inhibition of glucose transport into cells (ADA, 2020).

Issa & Baiyewu (2014), stated that a person's economic level or occupation affects them in performing self-care management including diabetes mellitus. On the other hand, economic limitations will limitoa person to seek information, care and treatment for himself. In addition, a person's socioeconomic influence is related to the patient's quality of life.

The results of filling out the MMAS-8 questionnaire showed that the subject's level of compliance was included in the low compliance category. The results of filling out the Compliance Questionnaire (MMAS-8) were more subjects who answered yes where each yes answer the score was 1. The assessment of the level of compliance was seen from the answers to the questionnaire, where if the score was > 2 then the patient had a low level of compliance. The results of the measurement of compliance are categorized into three levels, namely low compliance if the score is >2, moderate compliance if the score is 1 or 2 and high compliance if the score is <2 (Vika et al, 2016: 3).

Table II. The Profile of Medication Adherence (MMAS 8)

Characteristics	Pillbox	Medication Reminder Chart	Control
Pre-test (Mean)	0.355	0.336	0.418
Post-test (Mean)	0.709	0.654	0.6
P -value	*0.000*	*0.000*	*0.000*

Table II showed that both of intervention (pillbox and medication reminder chart) have a significant effect to enhamce medication adherence. This study same as the research conducted by Satish *et al* which shown that the use of pill boxes resulted in clinically considerable reductions in systolic BP as well as an increased number of patients meeting prescribed BP goals.

The results of this study are different from the research conducted by Alifia Putri Febriyanti, which stated that the use of medication reminder charts was not effective to improve medication adherence of geriatric patients with type 2 DM, it is assumed that the subjects of this study were geriatric patients who had limited mobility, memory loss, low levels of education and knowledge. The use of medication reminder charts is considered less helpful for patients in carrying out their treatment, because the majority of patients feel that marking on the medication chart after they take their medication is quite troublesome. This is because the patient has to find a pen, and the low level of education makes the patient less able to read which column should be marked for the medication that has been taken.

Table III. The Profile of Quality of Life (WHOQOL-BREEF)

Characteristics	Pillbox	Medication Reminder Chart	Control
Pre-test (Mean)	35	35.384	36.462
Post-test (Mean)	48.762	40.346	37.5
P -value	0.000	0.001	0.001

Based on the profile in table III, it showed that the pillbox intervention has the best increasing quality of life in geriatric patients with type 2 diabetic mellitus.

Conclusion

The *pillbox* is the best tool in improving medication adherence and quality of life among geriatric patients with type 2 diabetic mellitus.

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