

Adherence to Prescribed Medications among Patients with Chronic Diseases

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Abstract— Introduction: Multiple medications are prescribed to patients with chronic diseases making adherence an ongoing struggle for both patients and healthcare professionals. Hence, our aim was to evaluate the medication adherence level among patients with chronic diseases in Kelantan, Malaysia. **Methods:** We conducted a cross-sectional study from April 2017 until March 2019. Our inclusion criteria were adult patients with documented chronic diseases, treated in government hospitals and health clinics in Kelantan and on medications for at least one year. As for the intervention group, it consisted of patients who had at least 4 visits to the pharmacist-managed Diabetes Medication Therapy Adherence Clinic (DMTAC). Patients who were pregnant, breastfeeding, diagnosed with psychiatric disorders and those who were illiterate or unable to understand Bahasa Malaysia were excluded. The validated Malay version of Medication Compliance Questionnaire (MCQ) was used to measure medication adherence. Data were analyzed using SPSS version 20.0. **Results:** We recruited a total of 275 patients (control, n=144; DMTAC, n=131). Most of them were Malay (n=268, 97.5%), female (n=173, 62.9%) with mean (SD) age of 55.6 (11.4) years old. Mean (SD) medication adherence score for our study population was 88.7 (9.9) with 83.6% (n=230) patients were adherent. There was a significant difference in terms of medication adherence level when compared between both groups ($p=0.036$). Thirty (10.9%) patients were non-adherent in the control group while 15 (5.5%) patients were non-adherent in the intervention group. **Conclusion:** Overall, most of our patients with chronic diseases were adherent to their medications. Further research is warranted to determine factors associated with medication adherence.

Keywords— Adherence; medication; chronic disease; diabetes mellitus; Medication Therapy Adherence Clinic

I. INTRODUCTION

World Health Organization (WHO) defines chronic diseases as “having one or more of the following characteristics: they are permanent, leave residual disability, are caused by nonreversible pathological alteration, require special training of the patient for rehabilitation, or may be expected to require a long period of supervision, observation or care” [1]. In simpler terms, chronic diseases are physical or mental conditions of more than a year and require on-going treatment [2]. Such illnesses include non-communicable diseases and mental disorders, human immunodeficiency virus or acquired immunodeficiency syndrome and tuberculosis, which altogether represented 54% of the burden of all diseases worldwide in 2001 and is expected to exceed 65% by 2020 [3]. For people with chronic diseases, management of their conditions is fundamental to minimize their impact, improve health outcomes, prevent further disability and reduce healthcare costs.

Adherence to treatment, the extent to which patients are able to follow the agreed recommendations for prescribed therapy with healthcare provider, is a key component of chronic disease management [2]. It is reported as percentage with the cut-off point often set at 80% [4].

Multiple medications are prescribed to patients with chronic diseases making adherence an ongoing struggle for both patients and healthcare professionals. It is undeniable that many patients experience difficulty in following treatment recommendations which explains adherence to long-term

therapy for chronic illnesses in developed countries only accounted for 50%. In developing countries, the rates reported are even lower [3].

Non-adherence is associated with increasing morbidity and mortality as well as rising in health-care costs [1], [4]. Therefore, medication adherence has become the focal point in medication management to ensure optimal control and improved quality of life. If not managed appropriately, it is estimated that this can lead to a major impact on healthcare outcome and ultimately cost, productivity and growth [5].

In view of this, the Pharmaceutical Services Program under Malaysia Ministry of Health have introduced Medication Therapy Adherence Clinic (MTAC) in 2004 as part of the clinical pharmacy services in the Ambulatory Clinic System which emphasizes on medication management to improve on quality, safety and cost-effectiveness of patient care. The first MTAC introduced was for diabetes (DMTAC) that was initiated in Penang General Hospital [6]. Over the time span of a decade, MTAC has extended throughout the nation and expanded to other chronic diseases such as warfarin, respiratory illnesses, retroviral disease, stroke and rheumatology [7]. Hence, the aim of this study was to evaluate the medication adherence level among patients with chronic diseases in Kelantan, Malaysia.

II. METHODS

A. Design and Study Population

This was a cross-sectional study conducted from April 2017 until 2019. The study population was patients with

chronic diseases, treated in government hospitals and health clinics in Kelantan. The inclusion criteria were adult patients with documented chronic diseases on medications for at least one year. As for the intervention group, it consisted of patients who had at least 4 visits to the pharmacist-managed DMATC. Patients who were pregnant, breastfeeding, diagnosed with psychiatric disorders and those who were illiterate or unable to understand Bahasa Malaysia were excluded.

B. Data Collection

To prevent selection bias, patients were randomized using Random Number Generator [8]. Eligible patients were approached and informed of the study. Written consents were secured before they were instructed to answer a validated, self-administered questionnaire. The Medication Compliance Questionnaire (MCQ) in Bahasa Malaysia was granted the permission to be used as a tool to measure medication adherence in this study. Possible scores on the 10-item scale ranged from 1 to 5, with 1 indicating ‘never’ and 5 indicating ‘very frequent’. All negatively worded scores were reversed and all scores were converted to a 0 to 100 scale [9]. Patients were categorized as adherent if they had an individual score of 80 or greater [10].

Using Pocock’s two-proportion formula [11] with confidence level = 95%, $\alpha = 0.05$, power = 80%, prevalence of overall (known and undiagnosed) diabetes among Kelantanese (p_1) = 18.5% and prevalence of known diabetes among Kelantanese (p_2) = 7.1% [12] yielded a minimum of 131 subjects per arm. Subjects were distributed evenly among 26 facilities of government hospitals and clinics based on number of patients seen by pharmacist in year 2016.

C. Statistical Analysis

Statistical analysis was performed using SPSS version 20.0. All data were gathered and analyzed using descriptive statistics; mean (SD) and n (%). For further analysis, independent t-test was utilized for numerical data, while Chi-square test and Fisher’s exact test were applied for categorical data.

D. Ethical Approval

This research was registered with the National Medical Research Registry (NMRR-17-489-34938) and ethical approval was obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia. Permission to conduct the study at the site was obtained from the Kelantan Deputy Health Director. Participants were adequately informed regarding the study and voluntarily consented prior to data collection. A *p*-value of less than 0.05 was considered as statistically significant.

III. RESULTS

A. Socio-demographic and Clinical Characteristics

A total of 275 (control=144, intervention=131) subjects were recruited for the study with the mean (SD) age of 55.6 (11.4) years old and mean (SD) weight of 69.0 (12.7) kg. Most of the subjects were female (62.9%, n=173), Malay (97.5%, n=268) with secondary education (46.5%, n=128). Majority of

them were married (90.2%, n=248), employed (43.6%, n=120) with monthly income of less than RM1,000 (69.8%, n=192). They mainly did not exercise (65.8%, n=181), did not smoke (87.3%, n=240) and had more than 1 illnesses (84.6%, n=232) which was primarily diabetes mellitus (86.9%, n=239) (Table I).

TABLE I. Socio-demographic and clinical characteristics of study population (n=275)

Characteristics	n (%)
Group	
Control	144 (52.4)
Intervention	131 (47.6)
Gender	
Male	102 (37.1)
Female	173 (62.9)
Age (years old)	55.6 (11.4) *
Weight (kg)	69.0 (12.7) *
Race	
Malay	268 (97.5)
Non-Malay	7 (2.5)
Education level	
None / primary	81 (29.5)
Secondary	128 (46.5)
Tertiary	66 (24.0)
Marital status	
Single	27 (9.8)
Married	248 (90.2)
Employment status	
Employed	120 (43.6)
Unemployed	155 (56.4)
Monthly income (RM)	
<1,000	192 (69.8)
1,001 – 3,000	48 (17.5)
>3,001	35 (12.7)
Exercise	
Yes	94 (34.2)
No	181 (65.8)
Smoking	
Yes	35 (12.7)
No	240 (87.3)
No. of illnesses	
1	43 (15.6)
2	112 (40.7)
≥3	120 (43.6)
Diabetes mellitus	
Yes	239 (86.9)
No	36 (13.1)
Hypertension	
Yes	66 (24.0)
No	209 (76.0)
Hyperlipidemia	
Yes	134 (48.7)
No	141 (51.3)
Chronic kidney disease	
Yes	13 (4.7)
No	262 (95.3)
Cardiovascular disease	
Yes	25 (9.1)
No	250 (90.9)
Respiratory disease	
Yes	2 (0.7)
No	273 (99.3)

* Mean (SD)

B. Medication Adherence Level

The overall mean (SD) medication adherence score from MCQ was 88.7 (9.9) with 83.6% (n=230) patients were

adherent. Among the 10 questions, item 4 (you forget to take medication) scored the least with mean (SD) of 78.8 (15.9). All other items scored more than 80 (Table II).

TABLE II. MCQ score for each item by the study population (n=275)

Items	Mean (SD)
You take your medication as agreed with your doctor	87.1 (16.3)
You only take your medication when you are not feeling well	83.8 (23.2)
You find it difficult to take your medication everyday	85.6 (20.1)
You forget to take your medication	78.8 (15.9)
When you forget to take your medication, you take the following dose twice as much as directed by your doctor	97.0 (11.3)
You change the time to take the medication without consulting your doctor	92.9 (14.0)
You reduce the dose of medication when you are feeling well	90.6 (16.0)
You stop taking the medication when you feel that it is not effective	92.5 (14.8)
You stop taking the medication when you experience adverse effect from the medication	88.2 (18.1)
You stop taking the medication when you feel healthy	91.0 (16.1)

C. Association of Socio-demographic and Clinical Characteristics with Medication Adherence Level

We found that more respondents in the control group were significantly non-adherent when compared with the intervention group (10.9% vs. 5.5%, $p=0.036$). There was no significant relationship between medication adherence level and other variables except for patients who were diagnosed with hypertension, whereby they were associated with good medication adherence than those without (61.1% vs. 22.5%, $p=0.009$) (Table III).

IV. DISCUSSION

The ultimate goal of any prescribed medical therapy is to improve the outcomes of the patients. Chronic diseases are long-term medical conditions that are generally progressive. Therefore, patients with such illnesses; for instance, diabetes mellitus, stroke and cardiovascular diseases, require long-term use of medications to control their conditions. However, despite all the best intention and efforts on the part of the healthcare professionals, those results may not be achievable if the patients are not adherent [13], [14].

Thus, this has triggered many researches on the topics revolving medication adherence over at least the past 5 decades. In Malaysia, most of the studies still identified non-adherence as a major issue. Such example was the work by Ahmad et al. (2013) which noted that only 47% diabetes mellitus patients attending primary health clinics were adherent [15]. Other local studies carried out at government hospitals also revealed that 51.3% [16] and 73.9% [17] patients were taking their medications irregularly. Our patients however, showed otherwise with majority (83.6%) of them were adherent. The data borne the same resemblance as another multicentre study conducted at 10 tertiary hospitals in Malaysia which observed that 82.3% of the patients were found to be adherent to their medications [18].

Medication Therapy Adherence Clinic (MTAC) is an ambulatory care initiative offered by pharmacists in

collaboration with physicians with the aim of helping patients to achieve better medication adherence level and disease control [6]. In our setting, fewer patients in the intervention group (DMTAC) were non-adherent when compared with the control group (5.5% vs. 10.9%).

TABLE III. Association of socio-demographic and clinical characteristics with medication adherence level (n=275)

Characteristics	Adherent	Non-adherent	p-value
Group			
Control	114 (41.5)	30 (10.9)	0.036^b
Intervention	116 (42.2)	15 (5.5)	
Gender			
Male	85 (30.9)	17 (6.2)	0.917 ^b
Female	145 (52.7)	28 (10.2)	
Age (years old)	55.7 (11.1)	55.0 (13.2)	0.732 ^a
Weight (kg)	69.0 (12.7)	68.8 (13.0)	0.897 ^a
Race			
Malay	223 (81.1)	45 (16.4)	0.604 ^c
Non-Malay	7 (2.5)	0 (0.0)	
Education level			
None / primary	65 (23.6)	16 (5.8)	0.617 ^b
Secondary	109 (39.6)	19 (6.9)	
Tertiary	56 (20.34)	10 (3.6)	
Marital status			
Single	24 (8.7)	3 (1.1)	0.588 ^c
Married	206 (74.9)	42 (15.3)	
Employment status			
Employed	97 (35.3)	23 (8.4)	0.269 ^b
Unemployed	133 (48.4)	22 (8.0)	
Monthly income (RM)			
<1,000	158 (57.5)	34 (12.6)	0.405 ^b
1,001 – 3,000	40 (14.5)	8 (2.9)	
>3,001	32 (11.6)	3 (1.1)	
Exercise			
Yes	82 (29.8)	12 (4.4)	0.245 ^b
No	148 (53.8)	33 (12.0)	
Smoking			
Yes	28 (10.2)	7 (2.5)	0.534 ^b
No	202 (73.5)	38 (13.8)	
No. of illnesses			
1	37 (13.5)	6 (2.2)	0.542 ^b
2	96 (34.9)	16 (5.8)	
≥3	97 (35.3)	23 (8.4)	
Diabetes mellitus			
Yes	201 (73.1)	38 (13.8)	0.592 ^b
No	29 (10.5)	7 (2.5)	
Hypertension			
Yes	168 (61.1)	41 (14.9)	0.009^b
No	62 (22.5)	4 (1.5)	
Hyperlipidemia			
Yes	111 (40.4)	23 (8.4)	0.726 ^b
No	119 (43.3)	22 (8.0)	
Chronic kidney disease			
Yes	10 (3.6)	3 (1.1)	0.452 ^c
No	220 (80.0)	42 (15.3)	
Cardiovascular disease			
Yes	20 (7.3)	4 (1.5)	0.999 ^c
No	210 (76.4)	41 (14.9)	
Respiratory disease			
Yes	2 (0.7)	0 (0.0)	0.999 ^c
No	228 (82.9)	45 (16.4)	
Device			
Yes	108 (39.3)	22 (8.0)	0.812 ^b
No	122 (44.4)	23 (8.4)	

^a Independent t-test, ^b Chi-square test, ^c Fisher's exact test

The results were consistent with numerous investigations on the evaluation of MTAC program which managed to produce

positive clinical impact on the patients. All of the studies reported that there were significant improvements especially in terms of medication adherence with the pharmacist involvement in their medical therapy [19]–[21].

There are many barriers to non-adherence with the most common factor that impeded patients from taking their medications is forgetfulness [22]–[25]. Researches had shown that up to 50% patients forgot to take their medications. Awwad et al. (2015) reported that their patients mainly had issues with remembering or forgetting doses (38.4%) [25]. Meanwhile in another study, 49.6% patients mentioned forgetfulness as one of the major non-intentional reasons for non-adherence [26]. The same scenario was observed in our setting, whereby item “you forget to take the medication” had the least score. This problem could arise from various reasons such as unexpected activities and travelling [27].

Medication adherence is undeniably a complex variable with multiple determinants. There are mixed evidences on the effect of socio-demographic characteristics on medication adherence. Often, factors such as age, gender, race, educational level and marital status have significant influences on medication adherence [25], [28]. Having said that, the reports can be inconsistent due to variations in the sample population and study design [14], [28]. Contradicting findings were demonstrated in investigations by Bakar et al. (2016) and Hirst et al. (2016) which stated that socio-demographic characteristics did not define the adherence level among their study population [17], [29]. Likewise, we also observed that none of the socio-demographic variables were associated with medication adherence. As for clinical characteristics, only patients diagnosed with hypertension were found to be more adherent. This result was in-lined with another research conducted in Kelantan that suggested their patients were mainly adherent to their antihypertensive treatment regime [30].

Our study was subject to a few limitations. Despite being a multicentre study, it covered just patients from the state of Kelantan, which means that the findings might not appropriate to be generalized to the whole population of Malaysia. Also, the cross-sectional study design could only compare different population groups at a single point in time, making it hard to determine the causal relationships. Even so, the outcomes of this research can still be used as a reference to the current insights of medication adherence.

V. CONCLUSION

Overall, most of our patients with chronic diseases were adherent to their medications with less patients from DMTAC group were non-adherent. Even though they had good medication adherence level, continuing efforts are required to maintain and improve the standard. Further research is also warranted to determine factors associated with medication adherence.

CONFLICT OF INTEREST

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