

Original Article

The Effect of Structured Education to Patients Receiving Oral Agents for Cancer Treatment on Medication Adherence and Self-efficacy

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ABSTRACT

Objective: This study was conducted to examine the effect of structured education on medication adherence and self-efficacy through the use of the MASCC Oral Agent Teaching Tool (MOATT) for patients receiving oral agents for cancer treatment.

Methods: This quasi-experimental study has been conducted at two hospitals; 41 patients were included in the study. Data were obtained using a questionnaire, medication adherence self-efficacy scale (MASES), memorial symptom assessment scale, and a follow-up form (diary). Patients were educated through the use of the MOATT at a scheduled time; drug-specific information was provided along with a treatment scheme and follow-up diary. Phone interviews were completed 1 and 2 weeks after the educational session. At the next treatment cycle, the patients completed the same questionnaires. **Results:** Majority

of the patients were receiving capecitabine (90.2%; $n = 37$) as an oral agent for breast (51.2%; $n = 21$) and stomach cancer (24.6%; $n = 10$) treatment. About 90.2% of patients ($n = 37$) stated that they did not forget to take their medication and experienced medication-related side effects (78%; $n = 32$). The total score of MASES was increased after the education (66.39 vs. 71.04, $P < 0.05$). **Conclusions:** It was shown that individual education with the MOATT and follow-up for patients receiving oral agents for cancer treatment increased patient medication adherence self-efficacy.

Key words: Medication adherence, nursing, oral agents for cancer, patient education, self-efficacy

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Introduction

Oral agents for cancer are increasingly becoming a part of patient treatment regimens. Today, one in four drugs used in cancer treatment can be administered orally, and many newer agents are available only in oral form.^[1,2] These oral agents for cancer range from endocrine and traditional cytotoxic therapy to drugs that target specific genetic mutations. Although oral agents for cancer are often more manageable and convenient for patients, they pose challenges to effective drug delivery due to concerns about medication adherence.^[3]

Traditionally, cancer chemotherapy has been administered parentally in a specialized oncology clinic under relatively controlled environment. The recent introduction of new oral anticancer agents allows administration to take place outside these controlled settings such as in patient homes, rehabilitation centers, assisted living facilities, and nursing homes.^[4-7] This paradigm shift has put greater responsibility for medication adherence and safe handling on patients and caregivers.^[8] The International Society for Pharmacoeconomics and Outcomes Research has defined adherence as synonymous with compliance, i.e., “the degree or extent of conformity to the recommendations about day-to-day treatment by the provider with respect to the timing, dosage, and frequency” for “the duration of time from the initiation of the medication to discontinuation of therapy.”^[9]

Adherence with oral agents for cancer treatment is essential for optimal outcomes; however, studies focused on oral chemotherapy showed adherence ranging between 14% and 100%.^[10] Medication adherence is complex and dynamic process that involved with multiple factors and is an individual patient behavior that is difficult to objectively measure, monitor, and improve. Therefore, it may be greatest barrier to effective use of new oral agents if cancer care team fails to consider this potential, serious obstacle.^[3,11,12] A patient is considered to be nonadherent if he or she misses doses, takes additional doses to those prescribed, or takes doses either in the wrong quantity or at the wrong time.^[13]

There is an assumption that patients with cancer will adhere to treatment recommendations because of the seriousness of a cancer diagnosis; however, reports in the literature have demonstrated adherence conflicting results. Every patient is at risk for nonadherence.^[11] Problems with medication adherence include patient factors, disease factors, and system factors. Patient factors can include age, education, income, cognition, attitude, beliefs, expectations, perception of illness, the environment, or health literacy.^[14-16] Influencing disease factors can include several comorbid conditions, severity of disease, severity of outcome, and response to treatment. System factors

may include the organizational structure of the health-care system, the relationship with provider, and distance to health services.^[11,14-16] Patient’s beliefs about treatment and outcome expectations also affect their adherence behaviors.^[16]

The concept of self-efficacy was first described by Albert Bandura in 1977 as “people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (p. 71).^[17] Self-efficacy is an important feature that determines how an individual feel, thinks, and behaves. The patient’s expectations are also influential on adherence behavior and change. Bandura defines self-efficacy as the belief that an individual successfully applies a particular behavior.^[17] Patients need to be aware of the existence and consequences of nonadherence and need to be convinced that they have the capacity to manage their treatment themselves. In addition, they must have been given clear instructions on how to use the prescribed medication and must be able to correctly use the medication.^[18]

Although the primary responsibility for adherence to oral anticancer treatments lies with the patient, the oncology health-care team can have a significant impact on adherence to oral therapies. Since numerous factors contribute to patient medication adherence, it is unlikely that one single approach will be optimally effective. Instead, providers should use a multidisciplinary approach to promote medication adherence in their cancer patients.^[16,19]

Effective education, support, and follow-ups will enable patients to identify and report symptoms early, hence preventing the complications.^[20-22] In addition to these, patient education has a crucial role in ensuring patient safety, optimal dose, and compliance with the treatment plan. Oncology nurses should tailored patient education based on their needs and use multiple resources to reinforce information.^[15,23,24] Education specifically tailored for an individual patient with cancer may improve adherence. Therapeutic patient education when utilized effectively may maximize health outcomes and positively affect the quality of life of adult patients with cancer.^[25]

The MASCC Oral Agent Teaching Tool (MOATT) was designed to guide patient teaching and promote adherence to oral agents for cancer treatment^[26] and used in a recently published study.^[27] This study was aimed to examine the effect of structured education on medication adherence and self-efficacy through use of the MOATT for patients receiving oral agents for cancer treatment.

Methods

Design and sample

This quasi-experimental study has been conducted at two hospitals in Ankara, Turkey. Patients over than

18 years old who had received at least one course of oral chemotherapy and volunteered to participate were invited and 50 patients were included in the study. However, 9 of them did not completed postevaluation, and data analysis was done with 41 patients.

Data collection

Data were obtained through using questionnaire, medication adherence self-efficacy scale (MASES), memorial symptom assessment scale (MSAS), and a follow-up form (diary).

A questionnaire was prepared based on the literature^[8,11,13,14,21,28,29] consisted of 36 item on sociodemographics (age, gender, education, marital status, health insurance, income, occupation, employment status, and people living together), disease characteristics (diagnosis, duration of drug use, and comorbid diseases), treatment and medication adherence behaviors, any difficulties, and side effects.

MASES was developed by Ogedegbe *et al.*^[30] and is a 25-item scale that assesses the confidence of patients in their ability to take their antihypertensive medications in a variety of situations. The items were scored from 1 = not sure at all to 4 = very sure, and the total score on the measure was computed by averaging the responses to all of the items. Higher scores indicate a greater level of self-efficacy. MASES does not include subscales.

Gozum and Hacıhasanoğlu^[31] performed validity and reliability studies of MASES using Turkish patients with hypertension. Permissions were received from researchers to adopt into cancer patients receiving oral agents; item 18 was removed; 24 and 25 items were modified. Then, an expert panel of 9 members (faculty members from the nursing, hematology, and oncology; three specialist nurses; and staff nurse) was asked to rate each item of the modified MASES in terms of relevance, clarity, and simplicity as 1 (not relevant), 2 (somewhat relevant), 3 (relevant), or 4 (very relevant). The content validity index was used to determine the item validity, and the average content validity index was found to be 0.76 in the final version, thus indicating adequate content validity.

MSAS is a 32-item multidimensional scale developed by Portenoy *et al.*^[32] to evaluate the prevalence, characteristics, and level of distress caused by the most common symptoms experienced by cancer patients over the previous week. The Turkish translation and adaptation have been done in 2007 by Yıldırım *et al.*^[33] with the Cronbach's alpha coefficients were between 0.71 and 0.75 for the subscales and 0.84 for total MSAS.^[33]

In this sample, the internal consistency of the tools was computed for MASES ($\alpha = 0.82$) and MSAS ($\alpha = 0.93$).

Follow-up diary for patient receiving oral chemotherapy was developed by researchers for this study. Form includes sections to record possible side effects, how they evaluate its severity, any intervention they have done for managing, and how they feel after that.

Interventions

MOATT was developed to assist health-care providers in assess and teach patients about oral cancer treatment.^[26] MOATT provides a structured format to ensure that all key areas of patient assessment and teaching are addressed. The tool contains four sections; the first lists key questions to assess the patient's knowledge of the treatment plan, current medications, and ability to obtain and take an oral cancer agent. The second section contains general patient teaching instructions applicable to all oral cancer agents, such as storage, handling, and disposal, identifying a system for remembering to take the drug, and actions to take for various situations, such as a missed dose. The third section is used to provide drug-specific information, such as dose and schedule, side effects, and potential interactions. The last section lists questions that may be asked to ascertain understanding of the information provided. There is an additional page as a handout of drug-specific information that can be provided to the patient in the absence of any other prepared information.

Patients were educated through use of the Turkish version of the MOATT at a schedule time; drug-specific information was provided along with a treatment scheme and follow-up diary. Researcher, the first author was done individual education with patient and lasted about 30-60 min. Phone interviews were scheduled 1 and 2 weeks after the educational session. At the next treatment cycle, the patients completed the same questionnaires on medication adherence [Figure 1].

Statistical analysis

Statistical Package for Social Science (SPSS) version 17.0 (SPSS Inc. Released 2008. Chicago: SPSS Inc; September 2012; License Number: 1093910, Başkent University) was used for data entry and analysis. The data were analyzed using descriptive statistics, Chi-square test, and paired *t*-test analysis. Total score and item means of preeducation (T1) and posteducation (T2) MASES were compared with using paired *t*-test

Statistical analysis of the data for frequency and percentages was calculated for all responses in the survey; Chi-square test was used to compare variables. Results had 95% confidence interval with $P < 0.05$, indicating statistical significance.

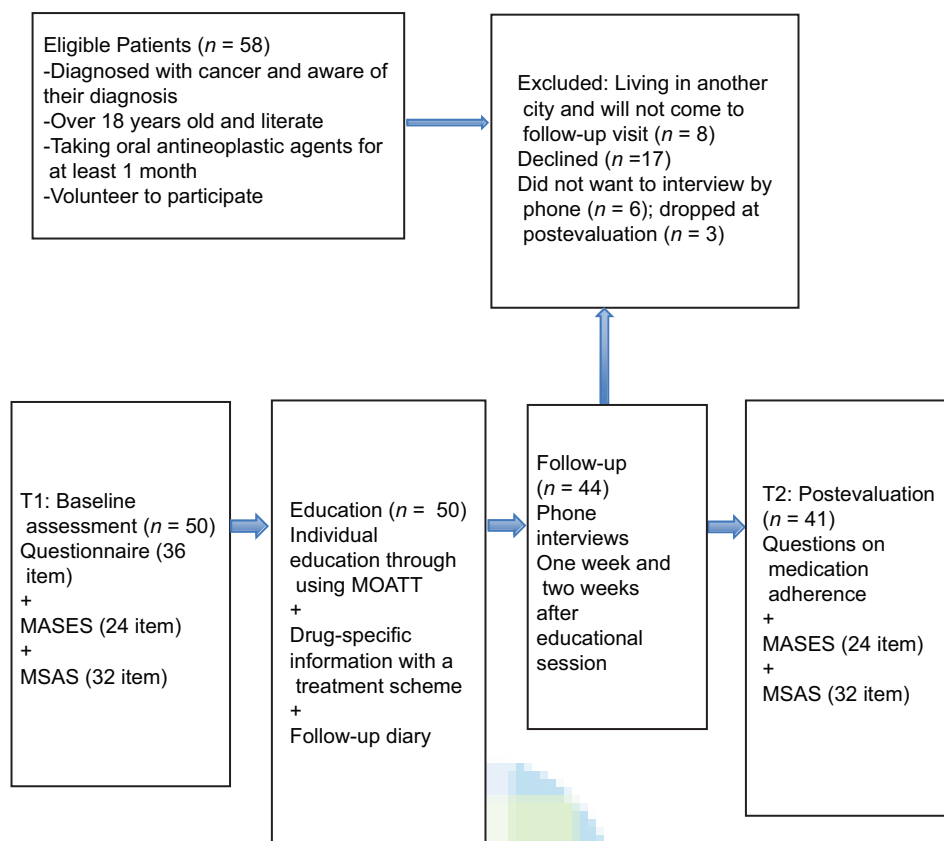


Figure 1: Flowchart of the data collection and intervention

Ethical considerations

The study was performed according to the Declaration of Helsinki and was approved by the Başkent University Institutional Review Board (Project No: KA10/65) and supported by Başkent University Research Fund. Permissions were received from the Provincial Health Directorate of Ankara and the ethics committee of the hospital. In addition, written consent after a detailed explanation about research was obtained from each patient.

Results

Demographic characteristics of the patients are shown in Table 1. Mean age was 51.8 years (standard deviation: 14.97; range: 19 and 86 years); 30% of them were 61 years old and over, 68% women, 68% married, 44% secondary/high school graduates, and 56% homemaker.

Half of (51.2%) them had breast cancer, and most of the participants (90.2%) had been using “capecitabine” tablets as the oral agent for their cancer treatment and were receiving both intravenous (IV) and oral chemotherapy at the time of the study. Most of them experienced medication-related side effects (78%); mostly cited as nausea (69.7%) [Table 2]. Patient-reported symptoms during the first and second follow-up were presented in Figure 2.

When examined the data from MSAS, most of them had lack of energy, nausea, dry mouth and taste alterations, lack of appetite, felt nervous, and constipation. In general, mean score of symptom severity and perceived symptom distress was slightly decreased after education which was not presented in the table.

When asked about common medication-taking behaviors, majority (90.2%) stated that they are not forgotten to take their medication ($n = 37$). However, 48.8% of them were stated that they usually take the drug later when they forgot to take drugs; one in fourth would skip their dose. Nearly half (41.5%) were not found the drug side effects as important. About one in third of the patients cited as no to the statement: “If I use my drugs regularly, I believe that I will get better” [Table 3].

The total score of MASES was increased after the education (66.39 vs. 71.04, $P < 0.05$). When analyzed item means of pre- and post-education scores, four items were found statistically significant ($P < 0.05$) [Table 4].

Discussion

Effectiveness of structured education on medication adherence and self-efficacy of patients receiving oral agents for cancer treatment was examined in this

Table 1: Patient demographics

Demographics	n (%)
Age (years)	
<30	3 (7.3)
31-40	5 (12.0)
41-50	10 (24.3)
51-60	11 (26.7)
>61	12 (27.7)
\bar{X}	51.8±14.97
Range	19-86
Gender	
Female	28 (68.3)
Male	13 (31.7)
Marital status	
Married	28 (68.3)
Single	5 (12.2)
Divorced	8 (19.5)
Educational status	
Read and write	4 (9.7)
Primary school	15 (36.6)
Secondary/high school	18 (44.0)
University/master	3 (7.3)
Other	1 (2.4)
Occupation	
Homemaker	23 (56.0)
Civil servant	5 (12.0)
Worker	5 (12.0)
Independent	2 (4.9)
Other	6 (15.1)
Income	
Equal with expenditure	19 (46.3)
Less than expenditure	19 (46.3)
Over than expenditure	2 (4.9)
Household/people living together	
Partner and children	19 (46.3)
Partner	14 (34.1)
Parents	5 (12.2)
Other	3 (7.3)
Total	41 (100.0)

study. It is known that self-efficacy is an important factor influencing medication adherence and adequate self-management.^[18] The result showed that individual education with the MOATT and follow-up for patients receiving oral agents for cancer treatment increased patient medication adherence self-efficacy. In the line with this result, recent reports highlighted that structured, home-based, multidisciplinary programs to promote adherence to oral agents have been shown to be effective in improving adherence, patient satisfaction, medication error rates, and management of side effects.^[20,21,27,34-38] Although increased attention to the issues related oral agents for cancer treatment, few evidence exist for interventions to promote medication adherence. In the recent systematic review^[25] on the effectiveness of therapeutic patient

education on adherence to oral anticancer medicines in adult cancer patients in ambulatory care setting, only two studies were reported. In a randomized trial,^[35] a nurse-led, tailored standard education, and coaching plan approach showed adherence benefits for study participants. The cohort study^[36] from Germany found that the intensified pharmaceutical educational intervention group demonstrated enhanced overall medication adherence than the standard education group.

Majority (90.2%) were reported that they are not forgotten to take their medication. However, one in third stated not believed that taking the drug would have positive outcomes, which would be a risk factor for nonadherence. In a study from Greece ($n = 99$), Saratsiotou *et al.*^[37] reported that unintended nonadherence to therapy was reported by 19 patients. The most important factor correlating with unintended nonadherence was the patient's belief regarding treatment effectiveness.^[37] According to a qualitative study,^[39] patients with cancer experienced inner conflict between rational belief and emotional resistance to taking medication due to confrontation with cancer, doubt regarding efficacy, and concerns over potential harm attached to use of the agent. Although they perceived themselves as being adherent to medication, they reported partial nonadherent behaviors. Therefore, patient understanding of oral agents for cancer treatment is essential to promote patient safety and adherence to the prescribed regimen.

Several factors were identified for nonadherence to oral agents for cancer treatment; complex regimens, lack of supervision, communication between health professionals, social support, cognitive/mental problems, beliefs on drug efficacy, side effects, and economic burden/drug cost.^[3,18,37] Studies of chronic diseases indicate that patients decrease adherence to medications as symptoms and adverse effects occur. Adverse events may substantially impinge on the quality of life and are related to nonadherence and early discontinuation of oral anticancer agents use.^[18]

Verbrugghe *et al.*^[40] were reported that toxicity from drugs is an important factor in nonadherence. In this study, although participants reported few symptoms at the baseline interview, they indicated to experiencing variety of side effects on MSAS. Patient-reported symptoms have been slightly increased during the first and second follow-up. This could be explained that patient awareness increased with education and follow-up and cumulative drug toxicity.

It was reported that patients who think the side effects of oral agents would be less than IV therapies tend to ignore complications.^[34,41] During IV chemotherapy administration, nurses monitor the side effects and can manage the therapy when they observe any adverse effects. Self-administration of oral cancer agents transfers

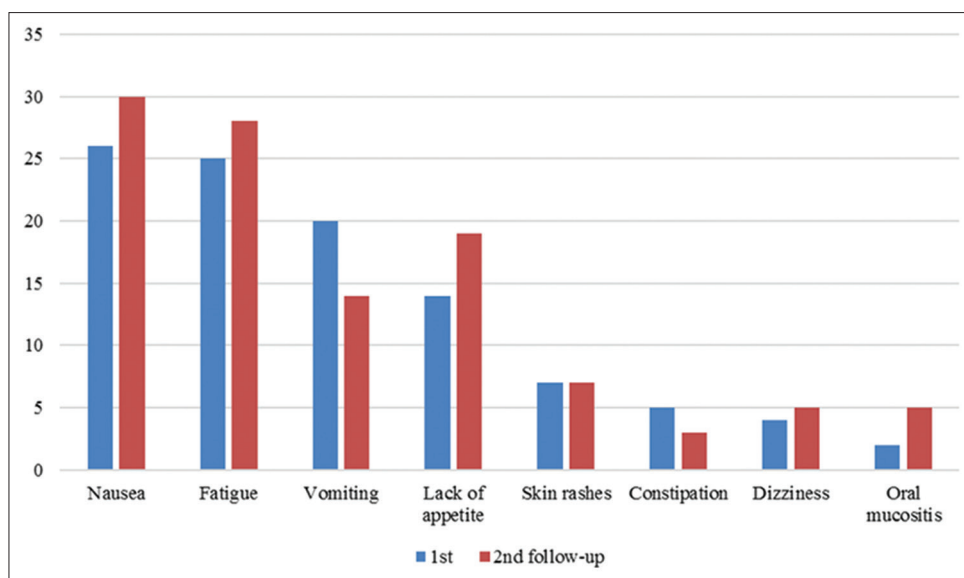


Figure 2: Patient-reported symptoms during the first and second follow-up (n = 41)

Characteristics	n (%)
Cancer diagnosis	
Breast	21 (51.2)
Stomach	10 (24.6)
Colorectal	5 (12.1)
Other	5 (12.1)
Anticancer drugs	
Capecitabine	37 (90.2)
Melphalan	1 (2.4)
Temozolomide	1 (2.4)
Thalidomide	1 (2.4)
UFT	1 (2.4)
Duration of anticancer drug use (months)	
2	34 (82.9)
3	5 (12.2)
4	2 (4.9)
Treatment	
Only oral chemotherapy	2 (4.9)
IV chemotherapy + oral chemotherapy	39 (95.1)
Side effects (n=32)	
Nausea	23 (69.7)
Dizziness	4 (12.1)
Distention	3 (9.1)
Other (constipation, diarrhea)	3 (9.1)
Comorbid diseases	
Yes	14 (34.1)
No	27 (65.9)

IV: Intravenous, UFT: Uracil-tegafur

responsibility for administration and monitoring from a team of health-care professionals to the patient or caregiver and may diminish opportunities to quickly identify and intervene when toxicity or side effects become apparent.^[41,42] Educational interventions can prevent complications, improve quality of life, and maintain medication adherence.

Educating patients about dosage, medication scheduling, adherence, and side effects can support optimal use of oral agents for cancer treatment. However, there is no single effective approach to educating patients; education should be tailored and organized for each individual patient to ensure appropriate, and patient-specific information is provided regarding oral agents for cancer treatment and adherence.^[43-45]

Health-care professionals should be prepared to meet the challenges of oral administration of anticancer agents and be available to give education.^[46] Education should include name of the drugs, appearance, dose, and schedule, how its work, how to take the drug, what to do if doses are missed, how to contact members of the health-care team, side effects management, and how to store and handle medication safely.^[3,46] Nurses are uniquely positioned within the oncology medical team to educate patients about the goals of treatment, how to take their medication and how to manage side effects, should they occur. Patients should take home information in the form of diaries, guidelines for dose reduction in case of adverse events, and side-effect support kits. This will help them to self-manage their treatment and may give them a greater sense of personal responsibility.^[19,23]

Limitations of this research include the fact that single group and having small sample size. In this study, majority of participants were receiving both IV chemotherapy regimens and oral agents, mostly capecitabine that should be considered when interpreting the data. Adherence rate might be different in patient receiving only oral agents.

Conclusion

Since oral agents are usually self-administered or administered by lay caregivers, patient education is vital to

Table 3: Responses on medication taking behaviors at baseline (n=41)

Statements	No, n (%)	Yes		
		Seldom/rarely, n (%)	Sometimes, n (%)	Usually, n (%)
I forgot to take drugs	37 (90.2)	2 (4.9)	2 (4.9)	-
When I forgot to take drugs, I take it later	8 (19.5)	8 (19.5)	5 (12.2)	20 (48.8)
When I forgot to take drugs, I skip dose that I am supposed to take that day	30 (73.2)	6 (14.6)	-	5 (12.2)
If I use my drugs regularly, I believe that I will get better	13 (31.7)	1 (2.4)	8 (19.5)	19 (46.3)
Side effects of the drugs that I have been using are not important for me	17 (41.5)	3 (7.3)	5 (12.2)	16 (39.0)
I can take drugs by splitting/crushing	34 (82.9)	4 (9.8)	1 (2.4)	2 (4.9)
I think I do not need drugs	35 (85.4)	1 (2.4)	5 (12.2)	-

Table 4: Comparison of item means of medication adherence self-efficacy scale before and after education

How confident are you taking your oral chemotherapy drugs*	Mean ± SD		P**
	Preeducation	Posteducation	
1. When you are busy at home	2.82±0.38	3.0±0.0	0.008
2. When you are at work/when you are busy at daily routine	2.92±0.26	3.0±0.0	0.083
3. When there is no one to remind you	2.90±0.37	2.90±0.37	1.0
4. When you worry about taking them for the rest of your life	2.85±0.35	3.0±0.0	0.014
5. When they cause some side effects	2.73±0.63	2.73±0.63	1.0
6. When they cost a lot of money	2.87±0.33	2.95±0.21	0.083
7. When you come home late from work/when your daily works finish late	2.95±0.21	2.97±0.15	0.317
8. When you are with family members	2.90±0.37	2.97±0.15	0.18
9. When you are in a public area	2.92±0.26	3.0±0.0	0.083
10. When you afraid of becoming dependent on them	2.80±0.51	3.0±0.0	0.023
11. When you afraid they may affect your sexual performance	2.90±0.37	2.90±0.37	1.0
12. When the time to take them is between your meals	3.0±0.0	3.0±0.0	1.0
13. When you feel you do not need them	2.63±0.69	3.0±0.0	0.004
14. When you are traveling	2.97±0.15	2.97±0.15	1.0
15. When you take them more than once a day	2.97±0.15	2.97±0.15	1.0
16. If they sometimes make you tired	2.90±0.37	2.90±0.37	1.0
17. If they sometimes make you get nauseated and vomit	2.87±0.33	2.92±0.26	0.317
18. When you have other medications to take	2.95±0.21	2.97±0.15	0.317
19. When you feel well	2.87±0.45	3.0±0.0	0.102
20. Get refills for your medications before you run out	2.95±0.21	2.95±0.21	1.0
21. Fill your prescriptions whatever they cost	2.90±0.30	2.90±0.30	1.0
22. Make taking your medications part of your routine	2.90±0.37	3.0±0.0	0.102
23. Always remember to take your cancer therapy medications	2.87±0.39	3.0±0.0	0.059
24. Take your cancer therapy medications for the specified time	2.95±0.21	3.0±0.0	0.157
Total	66.39±3.76	71.04±1.44	0.000

*1: Not sure, 2: Somewhat, 3: Extremely sure, **P<0.05. SD: Standard deviation

help ensure that the oral agents are being stored, handled, and taken correctly. Adherence is a complex and dynamic process that requires ongoing monitoring, education, and follow-up with individualized approach. Despite its importance, adherence is an individual patient behavior that is difficult to objectively measure, monitor, and improve.

It was shown that individual education with the MOATT and follow-up for patient receiving oral agents for cancer treatment increased patient medication adherence self-efficacy. The use of MOATT for patient teaching and follow-up evaluation of the effectiveness on medication adherence in the long term, from beginning of the treatment to the end, can be suggested.

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Conflicts of interest

There are no conflicts of interest.

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