



## Original Research

# Factors related to self-care drug treatment and medication adherence of elderly people in Japan



Haruka Ueno<sup>a,b,\*</sup>, Hirono Ishikawa<sup>b,c</sup>, Mio Kato<sup>b,c</sup>, Tsuyoshi Okuhara<sup>b</sup>, Hiroko Okada<sup>b</sup>, Takahiro Kiuchi<sup>b</sup>

<sup>a</sup> Department of Health and Dietetics, Faculty of Health and Medical Science, Teikyo Heisei University, Japan

<sup>b</sup> Department of Health Communication, School of Public Health, The University of Tokyo, Japan

<sup>c</sup> Graduate School of Public Health, Teikyo University, Japan

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## ABSTRACT

**Objectives:** The number of home-dwelling elderly people who need drug treatment is increasing with the aging of the population. Elderly people are often suffering from various chronic diseases requiring treatment with multiple drugs, which makes self-care at home difficult. This study focused on medication adherence and aimed to identify the current state of self-care for drug treatment in home-dwelling elderly people and the factors that relate to self-care and medication.

**Study design:** Cross-sectional study.

**Methods:** Medication adherence was measured on a 12-item medication adherence scale for home-dwelling elderly people aged 65 and over who were taking medications. The present condition of medication self-care for home-dwelling elderly people was clarified in terms of medication adherence. Next, we clarified the relationship between medication adherence and other factors such as demographic and clinical characteristics, communication with doctors, and health literacy.

**Results:** The average age was 73.7 (47.2% male). Functional health literacy and communicative health literacy were significantly associated with a high level of medication adherence. There was also a significant association between medication adherence and good communication with doctors.

**Conclusions:** Medication adherence among home-dwelling elderly people was found to be related to the ability to obtain, understand, and communicate information, in addition to the basic literacy skills of health literacy. We also found that good communication with doctors was closely related to medication adherence. Our findings suggest that it is necessary to be consciously involved in promoting health literacy and communication when supporting self-care for medical treatment of home-dwelling elderly people in the future.

## 1. Introduction

The number of home-dwelling elderly people who need drug treatment is increasing as the population ages [1].

In Japan, according to the 2018 Annual Report on the Aging Society [2], the population of people aged 65 and over in 2017 was the highest ever at 35.15 million, and the ratio of the population over 65 years (aging rate) in the total population was 27.7%. Japan's aging rate is expected to be 38.4% by the year 2065, with about 1 in 2.6 people aged 65 years and over [2]. Additionally, the number of patients with chronic diseases such as diabetes and cardiovascular disease is increasing, and treatment such as medication plays an important role. However, the average level of

medication adherence among patients with chronic diseases in developed countries is only 50% [3-5]

Continuous self-care with appropriate medications can prevent adverse effects by stabilising the symptoms of the disease, preventing the progress of the disease, and preventing the administration of inappropriate medications [6], but the state of implementation is not clear. Furthermore, when self-care becomes difficult as a result of dementia and physical problems due to aging, the provision of medical care is problematic [7,8].

Therefore, the objective of this study was to clarify the actual situation of self-care medication of home-dwelling elderly people. Specifically, by using a 12-item medication adherence scale consisting of four

\* Corresponding author. Department of Health and Dietetics, Faculty of Health and Medical Science, Teikyo Heisei University, Japan.

E-mail address: [uenoh-tyk@umin.ac.jp](mailto:uenoh-tyk@umin.ac.jp) (H. Ueno).

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subscales (related to relationships with medical professionals and psychological and social aspects), it is possible to identify not only the overall current situation, but also details about which aspects and factors make it difficult for patients to achieve medication self-care.

In relation to the medication self-care situation of home-dwelling elderly people, we clarified the relationship between medication adherence and other factors such as basic attributes and characteristics, clinical characteristics, communication with doctors, and health literacy, with the aim of providing useful information to support and improve the continuation of medication self-care.

## 2. Methods

In this study, we investigated the actual condition of medication self-care of home-dwelling elderly people using the medication adherence scale. Subjects were home-dwelling elderly people over the age of 65 with a chronic disease requiring continuous medication management, and those who had been taking medication of at least one tablet a day for more than half a year.

A major survey company sent a questionnaire by fax to target people from registered monitors nationwide, and the surveys were sent back by fax. The target number of subjects was approximately 500.

The explanatory document of the survey was faxed to home-dwelling elderly people over the age of 65 who had been on medication for more than half a year. The subjects were asked to read the explanatory document, and to check the “Agree and Answer” box in the first description of the questionnaire sent by fax. Those who consented then completed the questionnaire and returned it to the survey company by fax.

After return, the questionnaire results were set out in a table corresponding with the research ID, and the anonymised data was used as the survey data.

The sample size was approximately 385 based on calculations with an error of 5%, a confidence interval of 95%, and a population ratio of 50% extracted from the nationwide population.

The inclusion criteria were: home-dwelling elderly people over the age of 65 with a chronic disease that required ongoing medication management; those who had been on medication of at least one tablet a day for more than half a year; those who were able to understand and answer the contents of the Japanese questionnaire; and those who had a fax machine at home and were able to send and receive the questionnaire via fax.

Exclusion criteria were: questionnaires with over 10% of missing information; those who were not taking any medication; or those who were hospitalized at the time of the study.

## 3. Measures

### 1) Demographic and clinical characteristics

Subjects were asked for information about their sex, age, education level, whether they were living with someone else, burden of medical expenses, current lifestyle, health status, drug side effects, number of drugs taken, and their diagnoses.

### 2) Communication with doctors

We used a scale developed by Clayman et al.[9] to assess communication with doctors in a clinical setting: The Ask, Understand, Remember Assessment (AURA) comprises four items measuring self-efficacy in collecting, understanding, remembering, and evaluating medical information. We created a Japanese version of the scale after receiving the original authors’ approval, and performed a reverse translation of the content for verification. All items on the AURA are rated on a four-point scale consisting of agree (“a little” or “a lot.”) or disagree (“a little” or “a lot.”). Higher scores reflect a higher sense of self-efficacy regarding communication in a clinical setting.

### 3) Medication adherence

Medication adherence was measured using a 12-item version of the Medication Adherence Scale developed by Ueno et al.[10] for patients with chronic diseases. This scale comprises four subscales. The first contains three items on “medication compliance”, the second has three items on “collaboration with healthcare providers”, the third has three items on “willingness to access and use information about medication”, and the fourth has three items on “acceptance to take medication and how taking medication fits patient’s lifestyle”. These items are rated on a five-point scale ranging from 1 (“never”) to 5 (“always”). Higher scores indicate higher medication adherence.

### 4) Health literacy

Health literacy was measured using the health literacy scale developed by Ishikawa et al. [11] The reliability and validity of this scale have been confirmed [11]. The scale includes 14 items: five assessing functional health literacy, five gauging communicative health literacy, and four measuring critical health literacy. All items are rated on a four-point scale, with higher scores indicating higher health literacy levels.

#### 3.1. Analysis method

##### 1) Medication adherence and attributes, communication with doctors, and health literacy

Pearson’s product-moment correlation coefficient or Spearman’s rank correlation coefficient was calculated to identify the effect of each on the relationship between medication adherence and attributes, communication with doctors, and health literacy.

##### 2) Medication adherence and attributes, communication with doctors, and health literacy

The total of medication adherence and the four subscales are explanatory variables, and the attributes, communication with doctors, and health literacy (functional health literacy, communicative health literacy, critical health literacy) are the dependent variables. Multiple regression analysis was performed. The analysis was based on a model with controlled adherence to total medication adherence and subscales for each sex, age, number of types of drugs, final educational background, living with someone else, current lifestyle, medical expenses, and health status.

All analyses were conducted with SPSS version 26.0 (IBM SPSS Japan Inc., Tokyo, Japan).

## 4. Results

### 1. Subject characteristics

The questionnaire results of the 500 survey subjects who met the survey criteria after pre-testing are shown in Table 1. The average age was 73.7 years (range 65–98), with 47.2% of men and 52.8% of women. Almost all subjects (92.8%) lived with someone else, 53.0% had attended high school or less, and 44.4% had attended college or more.

### 2. Medication Adherence

Table 2 shows scores for items on the 12-item medication adherence scale.

### 3. Relationship between medication adherence and attributes, communication with doctors, and health literacy

Table 3 shows the relationship between medication adherence and

**Table 1**  
Demographic and clinical characteristics of participants (n = 500).

		Number	%
Sex	Male	236	47.2
	Female	264	52.8
Age (years)	Mean (range)	73.65	(65–98)
Education level	High school or less	265	53.0
	College or more	222	44.4
	Unknown	13	2.6
Living with someone else	Yes	464	92.8
	No (living alone)	36	7.2
Current lifestyle	Poor	31	6.2
	Fair	132	26.4
	Neither good nor bad	148	29.6
	Good	154	30.8
	Very good	34	6.8
Burden of medical expenses	None	75	15.0
	Rarely	191	38.2
	Sometimes	184	36.8
	Often	44	8.8
	High	4	.8
Health status	Excellent	19	3.8
	Very good	84	16.8
	Good	273	54.6
	Fair	107	21.4
	Poor	15	3
Drug side effects	Yes	53	10.6
Number of types of drugs	1	60	12
	2	94	18.8
	3	81	16.2
	4	71	14.2
	5	65	13
	6 or more	107	21.4
Total medication adherence	[12–60] <sup>a</sup>	46.0	6.3
Functional health literacy	[1–4] <sup>a</sup>	3.2	0.7
Communicative health literacy	[1–4] <sup>a</sup>	2.7	0.6
Critical health literacy	[1–4] <sup>a</sup>	2.4	0.6
Communication with doctors	[4–16] <sup>a</sup>	13.3	2.7
Diagnosis of participants		Total diagnoses <sup>b</sup>	(N = 500)
Diagnosis	Number		%
Diabetes			
Type 1	29		5.8
Type 2	78		15.6
Rheumatic disease	17		3.4
Hypertension	344		68.8
Dyslipidemia	157		31.4
Heart disease <sup>d</sup>	27		5.4
Lung disease <sup>e</sup>	28		5.6
Cancer	21		4.2
Others	113		22.6

Missing values excluded.

<sup>a</sup> [Number] is the score range.

<sup>b</sup> Includes both single and one of several diagnoses.

<sup>c</sup> Includes rheumatic disease and connective tissue disease.

<sup>d</sup> Includes vascular and cardiovascular disease.

<sup>e</sup> Includes asthma, emphysema, and chronic obstructive pulmonary disease.

health literacy, communication with doctors, and subject characteristics. For total medication adherence and health literacy, functional health literacy ( $\beta = 0.123$ ,  $p = 0.011$ ) and communicative health literacy ( $\beta = 0.289$ ,  $p < 0.001$ ) were significantly related. There was also a significant association between medication adherence and good communication with doctors ( $\beta = 0.280$ ,  $p < 0.001$ ).

Four of the subscales for medication adherence showed significant

**Table 2**  
Scores for items on the 12-item medication adherence scale (n = 500).

	Mean	SD
<b>Medication compliance</b>	14.3	1.47
1) Over the past three weeks, I have taken the prescribed daily dosage of my medication.	4.8	0.52
2) Over the past three weeks, I have followed the instructions about when or how often to take my medication.	4.8	0.61
3) I have stopped taking medication based on my own judgment (not including times when I forgot to take my medication)	4.6	0.79
<b>Collaboration with healthcare providers</b>	10.4	2.85
4) I feel comfortable asking my healthcare provider about my medication.	3.1	1.20
5) My healthcare provider understands when I tell him/her about my preferences in medication taking.	3.5	1.10
6) My healthcare provider understands when I explain to him/her about my past medication including previous allergic reactions.	3.8	1.20
<b>Willingness to access and use information about medication</b>	9.3	2.82
7) I understand both the effects and the side effects of my medication.	3.5	1.04
8) I report side effects, allergic reactions, or unusual symptoms caused by the medication.	3.3	1.36
9) I personally search for and collect information that I want about my medicine.	2.4	1.23
<b>Acceptance to take medication and how taking medication fits patient's lifestyle</b>	12.0	1.84
10) I accept the necessity of taking medication in the prescribed manner to treat my illness.	4.1	0.73
11) Taking medication is part of my everyday life, just like eating or brushing my teeth.	4.4	0.70
12) I sometimes get annoyed that I have to keep taking medicine every day.	3.5	1.11

associations with good communication with doctors – medication compliance ( $\beta = 0.143$ ,  $p = 0.007$ ), collaboration with healthcare providers ( $\beta = 0.304$ ,  $p < 0.001$ ), willingness to access and use information about medication ( $\beta = 0.149$ ,  $p = 0.001$ ), and acceptance to take medication and how taking medication fits patient's lifestyle ( $\beta = 0.166$ ,  $p = 0.001$ ).

With regard to medication adherence subscales and health literacy, there was a significant association between communicative ( $\beta = 0.157$ ,  $p = 0.014$ ) and critical ( $\beta = 0.143$ ,  $p = 0.017$ ) health literacy at the second subscale of “collaboration with healthcare provider”. In the third subscale of “willingness to access and use information about medication”, significant associations were found in the three categories of functional ( $\beta = 0.105$ ,  $p = 0.034$ ), communicative ( $\beta = 0.328$ ,  $p < 0.001$ ), and critical ( $\beta = 0.147$ ,  $p = 0.010$ ) health literacy. In the fourth subscale of “acceptance to take medication and how taking medication fits patient's lifestyle”, there was a significant association between functional ( $\beta = 0.216$ ,  $p < 0.001$ ) and communicative ( $\beta = 0.162$ ,  $p = 0.012$ ) health literacy. For medication adherence subscales and demographic and clinical characteristics, there was a significant association between living with someone else at the first subscale of “medication compliance” ( $\beta = 0.105$ ,  $p = 0.027$ ).

Additionally, there was a significant association between living with someone else ( $\beta = 0.122$ ,  $p = 0.006$ ) and burden of medical expenses ( $\beta = -0.122$ ,  $p = 0.018$ ) at the fourth subscale of “acceptance to take medication and how taking medication fits patient's lifestyle”.

## 5. Discussion

To clarify the medication self-care situation for home-dwelling elderly people, we used a 12-item medication adherence scale consisting of four subscales covering the subject's relationship with healthcare providers and psychological and social aspects. Overall, the average score for total medication adherence on the medication adherence scale was 46.0 out of 60 (76.6%), indicating that the overall score was nearly 80%. Previous studies have suggested that adherence differs depending on the diseases and the number of drugs [12,13], but this study targeted patients with various chronic diseases, and patients taking more than six drugs

**Table 3**  
Correlation coefficients between total score and four subscales of the 12-item Medication Adherence Scale (n = 500).

	Total score		Medication compliance		Collaboration with healthcare providers		Willingness to access and use information about medication		Acceptance to take medication and how taking medication fits patient's lifestyle	
	$\beta$	p	$\beta$	p	$\beta$	p	$\beta$	p	$\beta$	p
Functional health literacy	<b>0.123</b>	<b>0.011</b>	0.034	0.550	0.007	0.892	<b>0.105</b>	<b>0.034</b>	<b>0.216</b>	<b>&lt;0.001</b>
Communicative health literacy	<b>0.289</b>	<b>&lt;0.001</b>	0.028	0.683	<b>0.157</b>	<b>0.014</b>	<b>0.328</b>	<b>&lt;0.001</b>	<b>0.162</b>	<b>0.012</b>
Critical health literacy	0.084	0.134	-0.063	0.330	<b>0.143</b>	<b>0.017</b>	<b>0.147</b>	<b>0.010</b>	-0.069	0.253
Communication with doctors	<b>0.280</b>	<b>&lt;0.001</b>	<b>0.143</b>	<b>0.007</b>	<b>0.304</b>	<b>&lt;0.001</b>	<b>0.149</b>	<b>0.001</b>	<b>0.166</b>	<b>0.001</b>
Sex (male = 1, female = 0)	-0.049	0.270	-0.078	0.128	-0.041	0.381	-0.028	0.529	-0.004	0.937
Age	0.022	0.614	-0.064	0.207	0.005	0.907	0.027	0.547	0.087	0.068
Number of types of drugs	-0.009	0.835	0.093	0.054	-0.018	0.684	-0.021	0.623	-0.040	0.376
Education level	-0.018	0.700	-0.063	0.246	0.028	0.582	-0.010	0.838	-0.040	0.432
Living with someone else	0.066	0.103	<b>0.105</b>	<b>0.027</b>	0.035	0.420	-0.009	0.826	<b>0.122</b>	<b>0.006</b>
Current lifestyle	0.031	0.502	0.081	0.133	-0.002	0.967	0.016	0.740	0.014	0.778
Burden of medical expenses <sup>※1)</sup>	-0.003	0.957	0.054	0.329	0.007	0.897	0.047	0.329	<b>-0.122</b>	<b>0.018</b>
Health status <sup>※2)</sup>	-0.021	0.620	-0.077	0.122	0.027	0.558	0.009	0.840	-0.070	0.130

Missing values excluded.

※1 Burden of medical expenses (1: None – 5: High) ※2 Health status (1: Excellent – 5: Poor).

accounted for 21% of the cohort, suggesting that there was a high level of medication adherence regardless of the type of chronic disease or the number of drugs. Comparing the four subscales, with scores of 15 points for every three items, the first subscale “medication compliance” recorded 14.3 points; the second subscale “collaboration with healthcare providers” scored 10.4 points, the third subscale “willingness to access and use information about medication” scored 9.3 points, and the fourth subscale “acceptance to take medication and how taking medication fits patient's lifestyle” recorded 12.0 points. Of the four subscales, the first subscale “medication compliance” scored the highest, and the third subscale “willingness to access and use information about medication” scored the lowest. These results suggest that the content of implementation regarding medication compliance was good overall, but the score for understanding the information about drugs and reporting side effects was low [14], especially as it became clear that there were not many factors related to collecting information. It may be that the side effects were not understood and the symptoms were not serious, so they were not linked to the report, and the prescription of the drug was left to the doctor.

Regarding the relationship between total medication adherence and health literacy, functional health literacy and communicative health literacy were significantly related. Additionally, a high level of ability to obtain, understand and communicate information was found, and a significant relationship was also found between the high level of medication adherence and good communication with doctors. In previous research on information exchange between patients and doctors, it was found that communicative health literacy affects the provision of information from doctors. Higher levels of communicative health literacy result in more information being received from doctors [15]. Additionally, four of the subscales for medication adherence were significantly related to good communication with doctors. Previous studies have also reported on the relationship between good communication with doctors and compliance levels [16–19]. This not only relates to compliance with medication, but also to maintaining a good relationship with the doctor so that the patient can receive explanations about their medication and accept it in a positive way [20]. This also leads to patients feeling free to consult their doctor and report any unusual symptoms [14,21–24], and also helps to promote patient safety and prevent adverse events. As a result, not only will the patient's treatment improve, but their quality of life and physical condition will also improve [14,21–24].

With regard to medication adherence subscales and health literacy, there was a significant association between communicative and critical health literacy on the second subscale “collaboration with healthcare provider”. On the third subscale, “willingness to access and use information about medication”, there was a significant association between functional, communicative, and critical health literacy. Previous research

has indicated that information collection is related to communicative and critical health literacy [11,15], which is consistent with the results of this study. In the fourth subscale, “acceptance to take medication and how taking medication fits patient's lifestyle”, there were significant associations with functional and communicative health literacy. In order for the medication behaviour to be incorporated into the patient's life, the patient's consent and a low degree of burden of medical expenses for the medication are also relevant [14,19]. This study also revealed that higher levels of health literacy, functional and communicative health literacy are associated with the fourth subscale, “acceptance to take medication and how taking medication fits patient's lifestyle”.

For the medication adherence subscales and attributes, the first subscale, “medication compliance”, was significantly associated with living with someone else. Additionally, a previous study found that the degree of compliance with medications is better in the presence of support from a family living together [5,12]. Therefore, there is a possibility that the support of a family living together may result in compliant medication behaviour [5,12]. A significant association was also found between living with someone else and the burden of medical expenses in the fourth subscale, “acceptance to take medication and how taking medication fits patient's lifestyle”. This is further evidence that it is possible to adjust well to medication self-care with the support of a family living together [5,12]. Additionally, a previous study found that the burden of medical expenses leads to a feeling of the burden of treatment and medication [25,26], so those who feel that the burden of medical expenses and medication is low are more likely to view life with medication positively.

The first limitation of this study is that a high proportion of the subjects were living with their families, so it is likely that the reason for the relatively high level of medication adherence was related to the support for the medication treatment provided by the family. Future studies should examine the situation of elderly people living alone, including support status as a factor.

Secondly, our study did not compare subjects' responses in relation to their disease. This is because many of the subjects had multiple diseases, and even if the main disease was selected and the responses were examined by disease, the other diseases would still affect the answers. Therefore, the main purpose of this study was to confirm the medication adherence status regardless of the type and number of chronic diseases. In future research, it may be helpful to select and study subjects in an environment that allows confirmation of medication status by disease. Thirdly, all the indicators used in this survey were based on self-reported questionnaires, and it is possible that measurement errors may have occurred as a result of biased response trends of the subjects. Future studies should evaluate self-reported questionnaires together with other objective indicators including evaluation from other sources.

A positive aspect of this study was that we investigated the actual

situation of medication self-care for home-dwelling elderly people throughout Japan using the medication adherence scale to reveal the current state of medication adherence, and the factors related to medication adherence. Significantly, we were able to consider the factors of health literacy and communication with doctors.

Future support for medication self-care for home-dwelling elderly people should involve good communication with patients, taking into account the possibility of dementia and other factors that hinder understanding. Successful home-based medication self-care for elderly people requires the involvement not only of doctors, but also other health professionals.

### Ethics approval

The study was conducted with the approval of the Ethical Review Committee of the Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No.12050).

All participants provided their informed consent to participate in this study by checking “Agree and answer” at the top of the questionnaire.

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### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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