

Original Article



Evaluation of Older Adults or Their Caregivers' Attitudes and Preferences Toward Ease of Use and Compliance of Different Dosage Forms

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Abstract

Background: This cross-sectional descriptive study aimed to evaluate older adults or their caregivers' attitudes and preferences toward ease of use and compliance of various dosage forms and to improve medication consumption in the elderly population.

Methods: This research was conducted in 2021 using a validated questionnaire asking respondents about problems experienced through consuming various dosage forms, preferences regarding dosage forms and frequency, and demographics. The content validity index and content validity ratio were used in the validation evaluation.

Results: The incorrect medication in the elderly is mainly the result of forgetfulness. In addition, poor compliance was partly related to difficulty dividing tablets, large-sized drugs, and undesirable taste. Most elders preferred swelling pills and oral routes of administration. They further preferred to take fewer drugs in less-divided doses, just after a meal, at noon, or at bedtime. The child resistance packaging is unsuitable for them, and the blister or container with screw caps is preferred, and they adhere more to a medication when they are younger and more educated without relevance to gender or with whom they live.

Conclusion: Our findings revealed that the formulation and administration of drugs according to elder preferences could improve their adherence to the medication.

Keywords: Compliance, Dosage forms, Elderly, Patients' preferences

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Introduction

Regarding the World Health Organization (WHO) aging groups, any individual over 60 is assumed to be elderly (1). The elderly are more predisposed to chronic and recurrent diseases, which may require chronic and multiple medications (2). The elderly population suffering from chronic diseases is expanding worldwide (3). Most older adults take five or more medications each day, which certainly leads to polypharmacy and its subsequent problems. Older people taking multiple medications are at further risk of medication errors. These errors are a major concern for health care systems as they can reduce the effectiveness of treatment and increase medical expenses (4). Furthermore, poor instructions (labeling) (5), difficulty in opening child-resistant packaging, and misunderstanding of oral instructions persuade older adults not to use their medications as it is prescribed by their practitioners (6).

Older people can experience swallowing problems due to concomitant diseases (7), age-related physiological changes, and multiple medications. To facilitate swallowing drugs, many of the elderly change the dosage forms while taking it, including crushing the pills or opening the capsules (8). Studies show that the color, shape, and size of the solid dosage forms in oral administration are the most determining factors in patient compliance (9). Most patients prefer white, round-shaped, small-size, odorless, and tasteless solid dosage forms (10). Previous studies demonstrated that patients' compliance with medication corresponds to their educational status and knowledge about their diseases and medications. Generally, the desire to intake medicine is higher in people without functional defects, people who regularly take medication as a prevention approach, and those who have not experienced any side effects or do not live alone (2). Therefore, patients prefer the drug dosage form that is easier to swallow even



if it should be taken more than once a day (11). When choosing between drugs with almost equal efficacy and safety, physicians can consider the patient's preferences to obtain adherence to the medication (11,12). This study sought to investigate the elderly people or their caregivers' attitudes and preferences toward ease of use and compliance with different dosage forms and improve medication in the elderly population.

Materials and Methods

The present cross-sectional descriptive study was conducted between March 2021 and May 2021 in the pharmacies of Hamadan to evaluate the attitudes and preferences of the elderly or their caregivers toward the ease of use and compliance of different dosage forms by surveying and completing a questionnaire. The sample size of this study was calculated by Cochran's formula for a population with an unlimited number of members, with a sigma value of 0.5, an alpha error of 5%, and a margin error of 5%. Thus, the required sample size was determined as 385 people, randomized from the elderly or caregivers who had received service from the pharmacy. Critically ill patients were excluded from the study.

A questionnaire was developed as a data collecting instrument by compiling previous domestic and international studies (13) and utilized after localization and validation according to 16 specialist comments and a pilot study by 15 participants. Content validity was evaluated by calculating the content validity index (CVI) and content validity ratio (CVR). Considering that the structure of the questionnaire was not reflective, the assessment of Cronbach's alpha was not the case, and the test-retest method was used in this regard; the interval between the test and retest stages was two weeks.

Data were collected at the pharmacy site in the presence of one of the members of the research team, who provided samples or pictures for respondents to ensure their cognition of various dosage forms, especially the less prevalent ones.

To comply with ethical considerations, the purpose of the study, the participation voluntarily, and confidentiality of individual information were explained in a consent form at the beginning of the questionnaire. A chi-square test along with a subsequent Kendall's tau-b test was performed to evaluate the reliability of the study instrument, as it was needed to use a test-retest method.

In the descriptive analysis of the collected data, median, minimum, maximum, and quarter values were reported since quantitative variables did not represent a normal distribution, and the frequency was employed for qualitative variables. For inferential analysis, the Mann-Whitney U test and Kruskal-Wallis were used to compare different demographic groups in terms of regular use of medicine.

Results

Among 450 distributed questionnaires between the

participants, 385 were received as usable (the response rate was 85%).

Validity and Reliability of Study Instrument

In evaluating the over time (test-retest) reliability of the questionnaire, a significant correlation was observed between the answers of the test and retest ($P < 0.001$), and the relevant correlation coefficient was equal to 0.879, which shows the high reliability of the questionnaire. Regarding the CVI and CVR, the obtained values were in the acceptable ranges for all questions (0.82-1.00 and 0.64-1.00, respectively).

Characteristics of Study Participants

About half of the respondents were elderly themselves, and the remaining half included elderly caregivers (Table 1). The number of female and male participants was approximately equal. The youngest and oldest participants had 60 and 97 years old, respectively. The participants were at least on one medicine (including chemical or herbal) and supplement, and the maximum number of the medicine/supplement received by a participant in a day was reported as 18 items.

Regularity of Medication Use in Older Adults and the Reasons for the Lack of Regular Use

According to the participants' answers, only 21% (81 people) of the elderly permanently took their medication as prescribed for them. The reasons for non-regular use were questioned as well (Table 2). Forgetfulness was the main cause of irregular medication use in participants in this study. Noteworthy, 15% of the elderly stated that they stop the medication as soon as they feel better. The participants could choose more than one answer.

Correct Medicine Consumption

According to our findings, among 890 drugs and supplements used by the participants, more than 90% were consumed correctly. Moreover, six older adults in the study did not know the order of their medications.

Awareness of the Elderly About the Indications for Their Medications

The participants were aware of the indication for about 99% of consumption medications (875 items) while not knowing about indications only for 1% of medicines (8 items). Among these items, four, two, and two were administered for an elderly with uterus cancer, gastric cancer, and a person diagnosed with depression, respectively.

Routes of Administration and Elderly's Preferences Among Various Oral and Injection Administration Methods

More than half of the participants (68.8%) preferred the oral route among various routes of administration, and nearly 75% of them preferred the swallowing method. Additionally, half of the respondents preferred the

Table 1. Distribution of Characteristics of Participants in the Study

Variable	Variable Levels	Frequency	Frequency Percentage
Respondent	Elderly his/herself	205	53.2
	Elderly caregiver	180	46.8
Gender	Male	168	43.6
	Female	217	56.4
Education level	Illiterate	135	35.1
	Under high school diploma	124	32.2
	High school diploma or associate degree	73	19
	Bachelor degree	39	10.1
	Master degree or higher	14	3.6
Who do they live with?	Alone	88	22.9
	Child	71	18.4
	Spouse	185	48.1
	Spouse and child	41	10.6
Dwelling environment	Urban	286	74.3
	Rural	99	25.7
Age	Median: 67, Min: 60, Max: 97, 1 st quartile: 63, 3 rd quartile: 74		
Medications and supplements consumption	Median: 2, Min: 1, Max: 18, 1 st quartile: 1, 3 rd quartile: 4		

Table 2. The Reasons for the Lack of taking Medications by Elderlies

Reasons for the Lack of Taking Medications	Frequency	Frequency Percentage
Forgetting to take medicine	164	42.8
Having too many medications	46	12.1
Having difficulty with its usage	19	5.1
Thinking about its side effects	35	9.2
Being unpleasant with medication	11	2.9
Feeling uncomfortable while taking medicine in front of other people	16	4.4
Stopping medication when feeling better	57	15

intramuscular injection method, and about a quarter preferred the infusion. In some table cells, two items are mentioned, implying that the respondent has concurrently selected both of them (Table 3).

Elderly's Preferences Among Various Drug Dosage Forms

About half of the elderly participants (51.9%) preferred tablets, and 16.6%, 9.4%, and 7.3% of them preferred effervescent tablets, selected syrup, and soft-gel, respectively (Table 4). For 9.1% of the people, there was no difference between various oral dosage forms. Further, 43.6% and 30.4% of elderlies preferred ointment and cream among various dermal dosage forms, respectively. Moreover, 81.6% of the respondent preferred the drop among the ophthalmic different dosage forms. Approximately half of the respondents (47.5%) preferred the drop, and about a quarter of them preferred the spray among different nasal drug dosage forms. More than half of the elderly (58.2%) selected suppositories as their preferred rectal dosage forms. Two dosage forms are mentioned in some cells of the table, indicating that the respondent has concurrently selected both forms.

Table 3. Routs of Administration and Elderly's Preferences Among Various Oral and Injection Administration Methods

Elderly' s Preferences	Frequency	Frequency Percentage
Rout of administration		
Oral	264	68.8
Parental	61	15.8
Dermal	13	3.4
Ocular	1	0.3
Nasal	1	0.3
Rectal	1	0.3
Oral or parental	3	0.8
Oral or ocular	1	0.3
Oral or rectal	1	0.3
No difference	39	10.1
Various Oral Drug Administration Method		
Swallowing	284	73.8
Chewable	31	8.1
Troche	11	2.9
Mouthwash	3	0.8
Sublingual	8	2.1
Oral spray	7	1.8
Mucoadhesive in oral cavity	1	0.3
Swallowing or chewable	1	0.3
Swallowing or oral spray	1	0.3
No difference	36	9.4
Various Parental Administration Method		
Intramuscular	203	52.7
Intravenous	33	8.6
Infusion	85	22.1
Subcutaneous	14	3.6
Intramuscular or infusion	1	0.3
Intramuscular or subcutaneous	1	0.3
No difference	47	12.2

Table 4. Distribution of Elderly Preferred Dosage Forms

Dosage Form	Frequency	Frequency Percentage
Oral Dosage Forms		
Tablet	200	51.9
Effervescent tablet	64	16.6
Caplet	6	1.6
Hard capsule	3	0.8
Soft capsule	28	7.3
Syrup	36	9.4
Suspension	4	1.0
Powder	2	0.5
Tablet and effervescent tablet	1	0.3
Tablet and syrup	5	1.3
Soft capsule and powder	1	0.3
No difference	35	9.1
Dermal Dosage Forms		
Dermal patch	14	3.6
Ointment	168	43.6
Cream	117	30.4
Foam	8	2.1
Gel	22	5.7
Topical solution	6	1.6
Emulsion	1	0.3
Dermal patch or topical solution	1	0.3
Ointment and cream	1	0.3
Cream and gel	1	0.3
No difference	44	11.4
Ocular Dosage Forms		
Drop	314	81.6
Ointment	27	7.0
Gel	8	2.1
Intraocular injection	3	0.8
Drop and ointment	2	0.5
No difference	31	8.1
Nasal Dosage Forms		
Ointment	61	15.8
Drop	183	47.5
Gel	11	2.9
Spray	96	24.9
No difference	31	8.1
Rectal Dosage Forms		
Ointment	93	24.2
Suppository	224	58.2
Enema	4	1.0
No difference	58	15.1

Elderly Preference Among Different Types of Sprays

According to the statistical distribution of the elderly preferences among various types of sprays, nearly half of the respondents (48.3%) preferred the oral type, and 19.2% preferred the nasal form. In addition, for 29.9% of

the respondent, there was no difference between these two types of sprays.

Compliance of the Elderly With Various Dosage Forms

According to our findings, only 11 older adults in this study expressed that they have problems with the dosage forms of their medication. Among them, six people had difficulty with dividing metoprolol 50 mg tablets, two people complained of the large-sized metformin tablets, one complained about the size of the calcium capsule, and finally, two participants complained of the bad taste of Senna and Clopidogrel tablets.

Problems of the Elderly in Swallowing Tablets/Capsules and Syrups

Table 5 presents the frequency of problems for the elderly in swallowing tablets/capsules and syrups. Based on the results, 41.6% of the elderly reported that they had no problem with swallowing their tablets/capsules. The most common problem of the elderly was swallowing their large-size tablets/capsules with a frequency of more than one-third (35.7%). In other cases, two people mentioned stomach pain as their problem with taking tablets or capsules.

About half of the elderly (46.5%) indicated that they have no problem swallowing syrups. More than a third of the elderly (35%) reported that the reason for their difficulty with swallowing their syrups was their unpleasant taste. In other cases, three people mentioned heartburn as their problem for consuming syrup. Respondents could choose more than one option.

Compliance With Taking Several Drugs Concurrently

Eighty-eight participants were comfortable with taking the utmost one medicine a day. Only 1% stated they are comfortable taking four drugs or more concurrently. Almost about half of the elderlies declared they were comfortable taking upmost two drugs at once. It made no difference for about 10% of participants how many drugs they take simultaneously.

Comfort With the Number of Times of Taking Medications Daily

Nearly a third of the elderly mentioned that they prefer to take their drugs once a day, and 43.12% of the respondents were comfortable taking their medications up to twice a day. Additionally, none of the respondents chose to correspond to more than four times a day. Eighteen people stated that the number of daily consumptions did not matter to them.

Elderly Preferences About the Time Distance Between Taking Medicine and Food

Nearly, 38.44% of participants preferred to take the drug immediately after the meal and 15.84% of them selected the with the meal option. Furthermore, 13.25% and 11.17% of participants preferred to take medicine before

Table 5. Elderly Problems With Swallowing Tablets/Capsules and Syrups

Swallowing Problems	Frequency	Frequency Percentage
Tablet/Capsule Swallowing Problems		
Large size of tablets/capsules	137	35.7
Undesirable taste	38	10
Unsuitable coat	21	5.5
Undesirable shape	19	5
Nausea induction while swallowing	31	8.1
Disliking swallowing tablets/capsules	15	4
Other reasons	2	0.5
No problem	160	41.6
Syrup Swallowing Problems		
Undesirable taste	134	35
Inducing a burning sensation in the throat	20	5.3
Possibility of spilling medicine while consumption	33	8.7
Nausea induction while swallowing	45	11.9
Other reasons	3	0.8
No problem	179	46.5

the meal and desired to take the drug a long time after the meal, respectively. The most chosen option was after meals, and about one-fifth (21.04%) were indifferent to this issue.

Elderly Preferences About the Time of Taking Drugs

Based on the obtained data, 21.9%, 25.2%, 13%, and 24.5% of participants preferred to take drugs in the morning, in the afternoon, in the evening, and at bedtime. The most selected option was at noon, and 70 people indicated that they were indifferent about taking medicine. Respondents could choose more than one option.

Compliance With the Packaging of the Medicines

According to our findings, only two elderlies expressed that they have problems with the packaging of their drugs, one who had a problem with using the insulin pen, and the other one who believed that the containers were unhygienic packaging for the medicines.

Convenience With Different Packaging of Tablets and Capsules

Overall, 112, 122, and 63 people (About one-third of the elderly) were comfortable with plastic containers, blisters, and glass containers, respectively. One person selected a plastic container and blistered it concurrently. Further, 22.6% of the elderly stated that any packaging forms were preferable for them.

Convenience With Different Packaging of Syrups

Based on the results, 117 and 157 elderlies preferred glass and plastic bottles for packing syrups, respectively. Similarly, 28.8% of participants indicated that they prefer any packaging type for their syrups.

The Problems of Using a Container With a Child-Resistance Cap for the Elderlies

A quarter of the elderlies declared they had no problem opening child-resistance caps, and 36.62% of them stated that they have little difficulty opening this type of cap. Furthermore, 21.56% and 15.84% had moderate and major problems with opening this type of packaging, respectively.

Preference of the Elderly Among Various Types of the Cap for Tablets or Syrup Containers

In general, 61.3% and 12.73% of the studied elderlies preferred screw caps and preferred pressure caps for pill containers or syrup bottles, respectively. A quarter of participants declared any preference.

Comparison of the Regularity and Correctness of Medicine Consumption in Different Demographics Categories of the Elderlies

Overall, 63 and 11 people did not take any medicine at all and did not answer the questions relating to this issue, respectively, and the others used their medicines correctly. Therefore, the comparison of correct consumption between different groups of the elderly was not a matter in this study. There was no significant difference between males and females in terms of the regularity and correctness of medicine consumption (Table 6). In addition, whom they lived with did not noticeably affect this issue ($P>0.05$). Age and education level significantly influenced the regularity and correctness of medicine consumption ($P<0.05$). The regularity in medicine consumption became poorer by getting older. The education level was proportional to regularity in medicine consumption.

Discussion

Elderlies are susceptible to various chronic and age-related diseases⁽¹⁴⁾, and medication is one of the most important health-related issues about them. The difficulties elderlies face while consuming medication are the inability to open the package, swelling oral dosage forms, and the like. It is considerable to develop dosage forms in suitable shapes, colors, and sizes that are easily identified and consumed, allowing medical doctors to select and administer suitable dosage forms regarding the patient's age. One of the determining criteria for developing suitable characterized drug dosage forms is their caregiver's attitudes or preferences⁽¹³⁾. Therefore, study attempted to evaluate the older adults or their caregivers' attitudes and preferences toward ease of use and compliance with different dosage forms.

The results of the present study represented the irregular medication in the elderly population, which is mainly the result of forgetting to take drugs. The result of our study is in accordance with those of Gabriel et al, demonstrating that the reasons for irregular medication in elderlies are misunderstanding drug orders and forgetfulness (15).

In another study, Cramer reported that elderly patients

Table 6. Comparison of the Regularity and Correctness of Medicine Consumption in Different Demographic Categories of the Elderlies

Variable		Frequency	Mean Rank	P Value
Gender	Always regular use	81	189.80	0.735
	Sometimes irregular use	304	193.85	
Age	Always regular use	81	170.30	0.038
	Sometimes irregular use	304	199.05	
Education level	Always regular use	81	217.91	0.018
	Sometimes irregular use	304	186.36	
Who they live with	Always regular use	81	193.83	0.936
	Sometimes irregular use	304	192.78	

forget to take their medications because of poor physical skills, cognitive and memory defects, and polypharmacy situations (16).

According to Grocki and Huffman, a significant portion of the elderly population does not adhere to medication protocols and does not regularly take their drugs (17).

The findings of the current study revealed that more than 90% of the elderly took their drugs correctly, and only 1% of them did not know the correct order of their medications. Kendrick and Bayne found that factors resulting in incorrect medication in the elderlies are polypharmacy, poor labeling, and misunderstandings of oral prescriptions (6).

Based on the results of the present study, most older adults are aware of taking their medications. Few cases, who were unaware of the indication of their medication, were on the drugs prescribed for the treatment of depression or some types of cancer. A previous study showed that many elders do not comply with antidepressant agents, reflecting their poor insights into their disease and concerns about the side effects of drugs (18). Likewise, Pang et al concluded that medical doctors always refuse to inform their elder patients about their cancer diagnosis (19).

In formulation, poor compliance was related to difficulty dividing tablets, large-sized solid oral dosage forms, and undesirable taste. Our result is in line with the findings of Liu et al, indicating that formulation characterization, including taste, odor, and size of tablets, determines the elderly's compliance to medication. These findings on the elderly population's compliance with present formulations can create opportunities for developing safe, effective, and acceptable dosage forms for elderlies (20). In another study, Breitzkreutz and Boos found that the main problem of elderlies with taking oral liquid dosage forms is their undesirable taste (21). It can be concluded that the size of the tablet/capsule and the taste of drugs are the most important factors in formulating drugs for the elderly population.

This study represents that elderlies prefer the oral route and swelling tablet dosage form for administration of drugs. The results of a previous study by Sevilla et al represented that taking oral tablets is easier for the elderly (22). In addition, MacKenzie-Smith et al study revealed that patients usually prefer tablets among various dosage forms (13).

Our findings revealed that elderlies prefer not to take more than two drugs a day. This result conforms to those of Sevilla et al, indicating that elderly caregivers reported that monotherapy is more suitable for elderlies (22).

Moreover, elderlies preferred not to take drugs more than two times a day. Previously, Cramer reported that insufficient compliance with medication has a great influence on health care costs so that healthcare providers advise a simple medical regime, preferably 1 or 2 times a day, which includes all administered drugs (16).

Elderlies preferred to take their medication at noon and at bedtime, just after a meal. Dissatisfaction with the packaging was rarely reported in our study. The reports were related to difficulty using insulin pen and concern with multiple-dose packaging. Regarding our findings, about one-third of elders were comfortable with blister packaging for pills and capsules, and half of them preferred plastic bottles for packaging syrups. The results of a study by Braun-Münker and Ecker demonstrated that easiness in opening drug blisters has a noticeable effect on elderly patients because they could open these packages without any additional tool (23).

Our findings showed that using child resistance containers is difficult for elderlies. This is in conformity with the results of previous studies, representing that child-resistance containers are one of the reasons for incorrect medication in elderlies and this type of packaging should not be used for special populations, including elderlies (6,24).

Our results show that elderlies preferred screw caps for medicine containers. A previous study by Philbert et al represented that the risk of experiencing problems with peel-off and push-through blisters was higher than the risk of experiencing problems with opening bottles. Manufacturers are advised to pay more attention to the user-friendliness of product packaging. In addition, it is important that pharmacy staff clearly instruct patients on how to open their medicine packaging or assist them in choosing the most appropriate packaging (25).

Our result revealed that the regularity and correctness of medication are proportional to education level while being conversely proportional to age. In addition, no significant relevance was observed between regular and correct consumption with gender and loneliness or living with a family. All these findings are in line with those of Shruthi et al, except that in their study, increased compliance to medication was observed in the elderlies who did not live alone (2). There were no limitations to this study.

Conclusion

In general, it seems that the preferred route of administration for the elderly is the oral route and the preferred dosage form for them is the swallowing pill. The elderly explained their difficulty swallowing pills/capsules and syrup, large size, and inappropriate taste, respectively. They also preferred blisters or plastic containers with screw caps for packing tablets and capsules. Therefore,

pharmaceutical companies must make more efforts to reduce the size of tablets and capsules, betterment the taste of syrups, and package tablets in blister packs or plastic containers with screw caps for the elderly population.

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Authors' Contribution

FG conducted the data attainment and manuscript drafting, MR participated in analyzing data, manuscript drafting and its revision. In addition, MN generated the study idea. Finally, SA participated in manuscript drafting and serious revision of it.

Conflict of Interests

The authors declare that they have no conflict of interests.

Ethical Issues

The research was approved by the Research Ethic Committee of Hamadan University of Medical Sciences (IR.UMSHA.REC.1398.501).

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