



Consumer Awareness, Attitude, and Behavior Related to the Rational Use of Medicines in a Developing Country Context: The Case of Turkey

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Abstract

BACKGROUND: The high cost of medicines continues to be a major problem in health care.

AIM: This study aims to investigate the awareness, attitudes, and behaviors of consumers with regard to the rational use of medicine (RUM) in a developing country context.

METHODS: The study was designed as descriptive cross-sectional research. The survey was conducted in the two major cities of Turkey, namely, Ankara and Edirne, whose populations well-represent the socio-economic characteristics of the overall Turkish population between January and March 2016. A total of 2267 individuals participated in the survey. The survey consisted of 37 questions which included statements about various socio-demographic factors and the RUM. Frequencies and percentages were used for the presentation of qualitative data while cross-tabulations and Chi-square tests were utilized for the investigation of the relationships among research variables.

RESULTS: According to the findings, 54.7% of participants stated that they request medicine not related to their illness be added to the prescription; only 24.7% of them have heard the term “rational use of medicine.” The distribution of the responses related to handling unused medicines was significant for educational level ($p = 0.010$; $\alpha = 0.05$). At the same time, high school and university graduates are also more likely to take medicines in accordance with doctor’s advice compare to the other groups.

CONCLUSION: Our study results indicate that consumer awareness of the RUMs is at a low level and more effective consumer awareness campaigns are needed on this issue.

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Introduction

One of the most important sectors of the health-care services is pharmaceutical industry. The development of modern medicines is a very long, arduous, and expensive process that involves research and development (R&D) activities at a large scale that aims to increase effectiveness and efficiency in the pharmaceutical market [1]. The pharmaceutical industry has developed mainly in America and Europe and that the global access to medicines is maintained through firms which operate signals potential problems particularly for consumers of developing countries with regard to the high cost of medicines. Moreover, the factor that drives up the costs of medicines is the incidence called “drug resistance” which develops as a result of the irrational and inappropriate use of medications.

Consumers might engage in irrational behavior for many reasons. While individuals can recover from illnesses with a healthy diet and sufficient rest, they instead prefer to relieve their pain by resorting to

antibiotics or analgesics [2]. For this reason, in 1985, at the Nairobi Conference on the rational use of medicines (RUMs), the need to turn the issue of correct medicine prescription into a global movement was underlined. In 1989, it was determined that the policies with respect to the use of medicines in developing countries were limited, and later, the “Action Programme on Essential Medicines” and the “International Network for the RUMs” were formed by the World Health Organization (WHO) [3]. The concept of the RUM is defined by the WHO as “patients receiving medications appropriate to their clinical needs, in doses that meet their own requirements, for an adequate period of time, and at the lowest cost to them and their community” [4].

The Turkish Agency for Medicines and Medical Devices established the Department of RUMs to promote the responsible use of medicines in Turkey. This department prepared the “2014–2017 National Action Plan for the Rational Use of Medicines” to (a) effectively coordinate and cooperate the activities promoting the RUMs, (b) alter attitudes and behaviors of doctors, pharmacists, assistant health-care personnel, the public, and the medicine sector

related to the RUMs, and (c) increase the awareness and knowledge of all of the parties affected.

In the past 70 years, higher use of antibiotics has caused drug resistance. Furthermore, as a result of misuse of medications, negative consequences, such as losses in national health budgets and increases in drug prices, have occurred [5]. In the U.S., 45.8% of its population used one or more prescription drugs in a month in 2015–2016. The most prescribed medications according to age group are; bronchodilators for 0–11 age, central nervous system stimulants for 12–19 age, antidepressants for 20–59 age group, and lipid-lowering drugs for 60 years old and above [6]. On the other hand, Turkey is the first country (41, 1) in the defined daily dose of antibiotics in OECD countries [7]. For these reasons, decisions on RUM have been taken at the global, national, and local levels have been carried out since the early 2000s. The WHO has published the 2016–2030 strategic frameworks on access to safe, effective, and high-quality pharmaceuticals and medical products, which have recently been highlighted in sustainable development goals. According to this framework [8]; the number of countries with national policies on pharmaceuticals and other health technologies updated in the past 5 years; the number of countries reporting data on R&D investments for health; and the number of national regulatory authorities for vaccines determined as output indicators about rational drug use.

While policies on rational drug use have been developed at the international and national level, many studies have been carried out in the literature. Studies generally focus on the awareness and knowledge levels of healthcare workers and consumers. In many studies conducted with health-care professionals and health-care students, the level of knowledge about RUM is low [9], [10], [11], [12]. Most of the studies in Turkey show that the consumer knowledge level on RUM is low [13], [14]. In a study conducted in Sweden, determine that the awareness of Turkish immigrants in Sweden is higher than adults living in Turkey [15]. In a study conducted at a regional level in China, the RUM awareness of citizens is determined to be optimistic [16]. In recent years, studies evaluating the effectiveness of RUM policies have also been carried out. According to the results of the survey conducted in China, the use of antibiotics, intramuscular injection, intravenous injection, and the number of drugs prescribed per prescription decreased as a result of RUM policies. However, there is no significant change in medicine expenditure per prescription [17]. The importance of the indicators was emphasized in studies conducted in various countries regarding core drug use indicators determined by the WHO [18], [19], [20]. As a result of removing the economic incentives for physicians to prescribe excessive prescriptions in China, it was determined that the prescribing habits of primary care physicians did not change. It is also stated that more

comprehensive policies are needed for RUM [21]. In recent years, studies on rational drug use have been carried out in specific groups such as hypertensive, diabetic, and neonates [22], [23], [24]. The adoption and recognition of policies for practitioners and consumers are highly effective on success. As the studies reveal the current situation, it also sheds light on the solution suggestions.

This study tries to answer the following research questions: (a) Is the level of information of consumers living in Ankara and Edirne on the RUMs sufficient? (b) Does the level of information of consumers on the RUMs differ with respect to certain socio-demographic traits? and (c) Do the attitudes of consumers toward the RUMs differ with respect to certain socio-demographic traits? The main aim of this study is to contribute to this effort by measuring the impact of these campaigns on consumer preferences, attitudes, and behaviors with regard to the RUMs.

Methods

This study aims to provide a mark of significant issues that developing countries are experiencing related to the RUM at the scale of Ankara and Edirne Province. It is considered findings could be valuable with regard to the RUMs and improvements in public health policies in Turkey.

The present study was designed as a descriptive and cross-sectional research and conducted in the cities of Ankara and Edirne. While Ankara is the capital city of Turkey, Edirne is Turkey's door to Europe where health-care services for elderly population are developing with the "Active Aging City" mission. For this research, "The Rational Use of Medicines: Information and Attitude Evaluation Survey" was utilized as the data collection tool. This questionnaire was developed by the authors after a detailed review of relevant literature. The survey consisted of 37 questions which included statements about various socio-demographic characteristics of households and the RUMs. In this study, socio-demographic variables consist of age, gender, education level, income status, and social security information. The perception, attitude, and behaviors of consumers about RUM, try to analyze with questions such as their information and habits about use of medicines, awareness about RUM campaigns provided by the Ministry of Health.

The sampling frame of the research consisted of the pharmaceutical consumers which were living in the central districts of Ankara and Edirne and who were over 18 years old. However, due to the financial and time constraints, the convenience sampling method was used. The size of the samples was estimated as 1400 individuals for Ankara and 1200 individuals for Edirne. Participants were selected voluntarily. A total of

2267 individuals (1166 in Ankara and 1101 in Edirne) participated in the survey. The resulting response rate is 87%. The survey was conducted face-to-face with the participants by the researchers and the recruited pollsters between January and March 2016.

Because of the procedures of a general public survey in Turkey, before beginning this research, the necessary official permits were obtained from the local government of Ankara and Edirne Province.

The participants' rights were the priority. Therefore, the researchers gave oral information to participants about the aim of the study and withdrew at any point. The personal data of the participants were not received. The SPSS 22.0 software package was utilized to analyze the survey data. Frequencies and percentages were used for the presentation of qualitative data while cross-tabulations and Chi-square tests were utilized for the investigation of the relationships among research variables. $p = 0.05$ was statistically significant.

Results

The socio-demographic characteristics of the survey participants are presented in Table 1. According to this table, the total sample is equally divided by gender with 51.6% being female and 48.4% being male. The gender distribution of each city sample is in accordance with the actual gender ratio of the city population. About 86.7% of the survey participants have general health insurance and 6% have private health insurance; therefore, it could be said that the majority of the participants have some kind of social security.

The study results in Table 2 indicate that 21.3% of those who responded to the survey have a chronic illness and that the individuals live in Ankara (12.7%) displayed higher rates of chronic illnesses than those in

Edirne (8.6%). About 49% of the survey respondents said that they visit a hospital when they get sick, while 33.5% of those go to a family doctor, and 13% of implement integrative medicine practices. According to the findings of the current study on the attitudes of consumers toward the RUMs (Table 2), 54.7% of those who participated in the survey stated that they request that a medicine not related to their illness be added to the prescription. The study participants were questioned about their awareness of the RUMs. According to the answers given to these questions, only 24.7% of them have heard the term "rational use of medicines;" 16.5% of have watched a public awareness advertisement about the RUMs; and only 7.3% of have encountered information in a newspaper about the RUMs.

The attitudes and behaviors of the survey participants with respect to the RUMs were investigated in relation to important socio-demographic factors such as age, gender, education level, income level, and social security status. The results of our analyses are presented below:

Self-medication by age and education level

Self-medication could be an irrational behavior with regard to the use of medicines and was examined in this study. As shown in Table 3, the results of our study did not reveal any significant differences in self-medication behavior across different age groups ($p = 0.197$; $\alpha = 0.05$) and levels of education ($p = 0.128$; $\alpha = 0.05$).

Prescription reading behavior by education level

Another important finding obtained through this research is about consumer attitudes toward reading prescriptions. According to the findings (Table 4), the study participants who are high school or university graduates are more likely to read prescriptions compared to other participants ($p = 0.000$; $\alpha = 0.05$). The results show that educated consumers utilize medicines more rationally. Therefore, education or training of consumers about the RUMs can raise consumer awareness and produces more rational attitudes and behaviors toward medicine use.

Behavior of requesting extra medicines by age and education level

Surprisingly, the study participants who are high school or university graduates have a higher rate of requesting extra medicines in addition to those in their prescription (Table 5).

When the tendency to request extra medicines in addition to those included in the prescription is examined across the age groups, it is seen that those who are between 31 and 50 years of age have a higher rate of displaying this behavior ($p = 0.000$; $\alpha = 0.05$).

Table 1: The descriptive findings of the participants

Variable	Ankara		Edirne		Total	
	Frequency	%	Frequency	%	Frequency	%
Age						
18–30	436	19.2	205	9.0	641	28.3
31–40	260	11.5	287	12.7	547	24.1
41–50	238	10.5	316	13.9	554	24.4
51–64	162	7.1	205	9.0	367	16.2
65±	70	3.1	88	3.9	158	7
Gender						
Female	608	26.8	562	24.8	1170	51.6
Male	558	24.6	539	23.8	1097	48.4
Total	1166	51.4	1101	48.6	2267	100
Education						
Illiterate	53	2.3	25	1.1	78	3.4
Primary school	318	14.0	172	7.6	490	21.6
High school	425	18.7	378	16.7	803	35.4
University	343	15.1	426	18.8	769	33.9
Postgraduate	27	1.2	100	4.4	127	5.6
Social security						
General health insurance	937	41.3	1031	45.5	1968	86.8
Private health insurance	127	5.6	23	1.0	150	6.6
Not insured	102	4.5	47	2.1	149	6.6
Total	1166	51.4	1101	48.6	2267	100

Table 2: Comparison of responses given by survey participants about the rational use of medicines

Variable	Ankara		Edirne		Total	
	Frequency	%	Frequency	%	Frequency	%
Chronic illness						
Yes	289	12.7	195	8.6	484	21.3
No	877	38.7	906	40.0	1783	78.7
Medicine use for chronic illness						
Yes	266	11.7	179	7.9	445	19.6
No	900	39.7	922	40.7	1822	80.4
Steps taken in the case of an illness						
I go to the family doctor	395	17.4	365	16.1	760	33.5
I go to a hospital	538	23.7	574	25.3	1112	49.1
I treat myself with herbal medicines/food	152	6.7	145	6.4	297	13.1
I consult to my pharmacist	39	1.7	13	0.6	52	2.3
I consult to my family and friends about which medicines to take	22	1.0	4	0.2	26	1.1
Other	20	0.9	0	0.0	20	0.9
Self-medication						
Yes	364	16.1	339	15.0	703	31.0
No	802	35.4	762	33.6	1564	69.0
Reading the prescription						
Yes	878	38.7	875	38.6	1753	77.3
No	288	12.6	10.0		514	22.7
Prescription received from						
Family doctor	561	24.8	509	22.5	1070	47.2
Hospital	542	23.9	554	24.5	1096	48.4
Without prescription	61	2.7	38	1.7	99	4.4
Requesting medicines in addition to those prescribed						
Yes	679	30.0	560	24.7	1239	54.7
No	486	21.4	541	23.9	1027	45.3
Leftover medicines						
I keep them	702	31.0	720	31.8	1422	62.8
I throw them away	304	13.4	259	11.4	563	24.8
I give them to someone in need	59	2.6	48	2.1	107	4.7
I take them back to the pharmacist	68	3.0	58	2.6	126	5.6
Other	32	1.4	16	0.7	48	2.1
Medicine storage conditions						
Medicine cabinet	335	14.8	354	15.6	689	30.4
Refrigerator	482	21.3	437	19.3	919	40.6
Drawer	303	13.4	299	13.2	602	26.6
Other	45	2.0	11	0.5	56	2.5
Medicine sorting out						
Yes	705	31.1	778	34.3	1483	65.4
No	460	20.3	323	14.3	783	34.6
The number of expired medicines						
0 Boxes	695	30.7	703	31.0	1398	61.7
1–2 Boxes	246	10.9	286	12.6	532	23.5
3–4 Boxes	152	6.7	92	4.1	244	10.8
5–10 Boxes	65	2.9	13	0.6	78	3.4
11 Boxes or more	8	0.4	7	0.3	15	0.7
Type of medicines in the medicine cabinet						
Painkillers	302	13.3	575	25.4	877	38.7
Muscle relaxers	27	1.2	186	8.2	213	9.4
Antibiotics	12	0.5	270	11.9	282	12.4
Vitamins	5	0.2	55	2.4	60	2.6
Other	820	36.2	15	0.7	835	36.8
Implementation of medicine treatment						
I use them for the time period and in doses as recommended by my doctor	831	36.7	811	35.8	1642	72.5
I stop my medication as soon as my complaints subside	280	12.4	267	11.8	547	24.2
I reuse the same medicines without consulting to my doctor if my complaints do not subside	51	2.3	23	1.0	74	3.3
When the daily dose is forgotten						
I take the dose as soon as I remember	591	26.1	723	31.9	1314	58.0
I double the next dose	136	6.0	86	3.8	222	9.8
I consult to my doctor/pharmacist	261	11.5	232	10.2	493	21.8
I stop taking the medicine	57	2.5	45	2.0	102	4.5
Other	118	5.2	15	0.7	133	5.9
Do you check to see if the prescribed medicine is correct or not						
Yes	754	33.3	781	34.5	1535	67.7
No	412	18.2	320	14.1	732	32.3
Who provides service to you at the drugstore						
The pharmacist	486	21.4	405	17.9	891	39.3
Other personnel	679	30.0	696	30.7	1375	60.7
Does the pharmacist provide you with enough information about how to use the medicine?						
Yes	878	38.7	894	39.4	1772	78.2
No	288	12.7	207	9.1	495	21.8
Do you use equivalent medicines?						
Yes	462	20.4	528	23.3	990	43.7
No	703	31.0	573	25.3	1276	56.3
Do you take medicines with you when you are going on vacation?						
Yes	927	40.9	809	35.7	1736	76.6
No	238	10.5	292	12.9	530	23.4
Medicine use based on advice						
Yes	265	11.7	259	11.4	524	23.1
No	898	39.6	842	37.2	1740	76.8
Purchasing medicines advertised on TV and newspaper						
Yes	169	7.5	157	6.9	326	14.4
No	997	44.0	944	41.6	1941	85.6
Informing the doctor about allergies						
Yes, I do inform	777	34.3	878	38.7	1655	73.0
No, I do not inform	123	5.4	93	4.1	216	9.5
I only inform if asked about it	266	11.7	130	5.7	396	17.5
In favor of contribution rates for examination and medicine payments						
Yes	149	6.6	141	6.2	290	12.8
No	1017	44.9	960	42.3	1977	87.2

(Contd...)

Table 2: (Continued)

Variable	Ankara		Edirne		Total	
	Frequency	%	Frequency	%	Frequency	%
Should medicines be sold at supermarkets?						
Yes	125	5.5	104	4.6	229	10.1
No	1040	45.9	997	44.0	2040	89.9
Have you ever heard of the term RUM?						
Yes	273	12.0	286	12.6	559	24.7
No	893	39.4	815	36.0	1708	75.3
Have you ever received any education about RUM?						
Yes	60	2.6	30	1.3	90	4.0
No	1105	48.8	1071	47.3	2176	96.0
Have you ever seen a public awareness ad about RUM?						
Yes	193	8.5	181	8.0	374	16.5
No	973	42.9	919	40.5	1892	83.5
Have you ever come across a newspaper report on RUM?						
Yes	78	3.4	88	3.9	166	7.3
No	1088	48.0	1012	44.7	2100	92.7
Have you ever seen any brochures, books or leaflets about RUM?						
Yes	121	5.3	122	5.4	243	10.7
No	1045	46.1	979	43.2	2024	89.3
Total	1166	51.4	1101	48.6	2267	100

RUM: Rational use of medicines.

Table 3: Cross-tabulation of self-medication by age and education level

Variables	Yes		No		p
	Frequency	%	Frequency	%	
Age					
18–30	210	29.9	431	27.6	0.197
31–40	180	25.6	367	23.5	
41–50	170	24.2	384	24.6	
51–64	96	13.7	271	7.1	
65±	47	6.7	111	4.9	
Total	703	100	1564	100	
Education level					
Illiterate	32	4.6	46	2.9	0.128
Primary school	141	20.1	349	22.3	
High school	243	34.6	560	35.8	
University	240	34.1	529	33.8	
Postgraduate	47	6.7	80	5.1	
Total	703	100	1564	100	

Significant at the 0.05 level.

The behavior of requesting extra medicines from the doctor is likely to be demonstrated by older and more educated consumers ($p = 0.000$; $\alpha = 0.05$).

Handling leftover medicines by social security status, education level, and gender

As shown in Table 6, a highly interesting finding was revealed regarding the leftover medicines. The consumer group which has the highest rate of throwing away leftover medicines (21.1%) is the one that is covered by the general health insurance ($p = 0.000$; $\alpha = 0.05$). It is believed that the fact that this group has lower out-of-pocket expenses for purchasing medicines compared to others has led to this outcome. The distribution of the responses related to handling leftover medicines was also examined in relation to education level and gender. While the results were significant for educational level ($p = 0.010$; $\alpha = 0.05$), they were found to be insignificant for gender ($p = 0.148$; $\alpha = 0.05$). The participants with high school or university education are more likely to keep the leftover medicines.

The number of expired medicines kept by consumers with respect to education and income levels

After comparing those who keep expired medicines in their medicine cabinet with respect to their

Table 4: Comparison of those who read medicine prescriptions and those who do not with respect to their education level

Variables	Do you read the prescriptions of medicines?				p
	Yes		No		
	Frequency	%	Frequency	%	
Education level					0.000*
Illiterate	48	2.7	30	5.8	
Primary school	355	20.3	135	26.3	
High school	605	34.5	198	38.5	
University	645	36.8	124	24.1	
Postgraduate	100	5.7	27	5.3	
Total	1753	100	514	100	

(*) Significant at the 0.05 level.

education and income levels, it was found out that high school and university graduates ($p = 0.000$; $\alpha = 0.05$) and those who have incomes between 1300 TL and 3000 TL ($p = 0.000$; $\alpha = 0.05$) are more likely to keep one or two boxes of expired medicines (Table 7).

The implementation of medicine therapy with respect to age and education levels

The implementation of medicine therapy was assessed by considering three actions consumers would take: (a) Taking medicines in accordance with doctor's advice, (b) stopping taking the medicines after complaints subside, and (c) if complaints do not subside, starting to take the same medicine. We did not find significant differences in the number of responses given with regard to each alternative action of the medicine therapy implementation when the age of the survey participants was considered ($p = 0.078$; $\alpha = 0.05$) (Table 8). However, when the education levels of the respondents were taken into account, we found significant differences in the responses of the survey participants ($p = 0.010$; $\alpha = 0.05$). According to the results, high school and university graduates are more likely to engage in the irrational behavior of stopping to take the medicines after complaints subside compared to the other education groups. At the same time, high school and university graduates are also more likely to take medicines in accordance with doctor's advice compared to the other groups.

Table 5: Comparison of those who request extra medicines in addition to those included in the prescription and those who do not with respect to age and education level

Variables	Requesting extra medicines				Total		p
	Yes		No		Frequency	%	
	Frequency	%	Frequency	%	Frequency	%	
Age							
18–30	301	13.3	339	15.0	640	28.2	0.000*
31–40	295	13.0	252	11.1	547	24.1	
41–50	324	14.3	230	10.2	554	24.4	
51–64	214	9.4	153	6.8	367	16.2	
65±	105	4.6	53	2.3	158	7.0	
Education level							0.000*
Illiterate	57	2.5	21	0.9	78	3.4	
Primary school	328	14.5	162	7.1	490	21.6	
High school	414	18.3	388	17.1	802	35.4	
University	383	16.9	386	17.0	769	33.9	
Postgraduate	57	2.5	70	3.1	127	5.6	

(*) Significant at the 0.05 level.

Table 6: Comparison of the condition of leftover medicines with respect to social security status, education level, and gender

Variables	The condition of leftover medicines										p		
	I keep them		I throw them away		I give them to someone in need		I return them back to the drug store		Other			Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
Social security													
General health insurance	1255	55.4	478	21.1	73	3.2	116	5.1	45	2.0	1967	86.8	0.000*
Private health insurance	77	3.4	44	1.9	18	0.8	9	0.4	2	0.1	150	6.6	
Not insured	90	4.0	41	1.8	16	0.7	1	0.0	1	0.0	149	6.6	
Education level													0.010*
Illiterate	57	2.5	12	0.5	2	0.1	2	0.1	5	0.2	78	3.4	
Primary school	292	12.9	118	5.2	29	1.3	40	1.8	10	0.4	489	21.6	
High school	496	21.9	216	9.5	38	1.7	42	1.9	11	0.5	803	35.4	
University	496	21.9	183	8.1	35	1.5	34	1.5	21	0.9	769	33.9	
Postgraduate	81	3.6	34	1.5	3	0.1	8	0.4	1	0.0	127	5.6	
Gender													0.148
Female	773	31.9	313	13.8	47	2.1	62	2.7	24	1.1	1169	51.6	
Male	699	30.8	250	11.0	60	2.6	64	2.8	24	1.1	1097	48.4	

(*) Significant at the 0.05 level.

Table 7: Comparison of the number of expired medicines kept in the medicine cabinet with respect to education and income levels

Variables	The number of expired medicines in the medicine cabinet										p		
	0 Boxes		1–2 Boxes		3–4 Boxes		5–10 Boxes		11 Boxes or more			Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
Education Level													
Illiterate	36	1.6	11	0.5	17	0.7	12	0.5	2	0.1	78	3.4	0.000*
Primary school	259	11.4	119	5.2	77	3.4	33	1.5	2	0.0	490	21.6	
High school	510	22.5	197	8.7	69	3.0	21	0.9	6	0.3	803	35.4	
University	506	22.3	178	7.9	71	3.1	10	0.4	4	0.1	769	33.9	
Postgraduate	87	3.8	27	1.2	10	0.4	2	0.1	1	0.0	127	5.6	
Income level													0.000*
No income	190	8.4	74	3.3	36	1.6	7	0.3	2	0.1	309	13.6	
Minimum Wage	296	13.1	111	4.9	37	1.6	13	0.6	1	0.0	458	20.2	
1301–1999 TL	346	15.3	137	6.0	91	4.0	47	2.1	5	0.2	626	27.6	
2000–2999	373	16.5	140	6.2	57	2.5	7	0.3	5	0.2	582	25.7	
3000–3999	137	6.0	51	2.3	15	0.7	2	0.1	0	0.0	205	9.0	
4000+	55	2.4	19	0.8	8	0.4	4	0.2	0	0.0	86	3.8	

(*) Significant at the 0.05 level.

Table 8: Comparison of the implementation of medicine therapy with respect to age and education levels

Variables	Implementation of medicine therapy						Total		p
	I take medicines in accordance with doctor's advice		I stop taking the medicines after my complaints subside		If my complaints do not subside I start taking the same medicine		Frequency	%	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
Age									
18–30	438	19.3	180	8.0	22	1.0	640	28.3	0.078
31–40	389	17.2	139	6.1	17	0.8	546	24.1	
41–50	407	18.0	127	5.6	19	0.8	553	24.4	
51–64	284	12.5	71	3.1	12	0.5	367	16.2	
65±	124	5.5	30	1.3	4	0.2	158	7.0	
Education level									0.010*
Illiterate	59	2.6	14	0.6	5	0.2	78	3.4	
Primary school	362	16.0	108	4.8	20	0.9	490	21.6	
High school	551	24.3	229	10.1	21	0.9	801	35.4	
University	577	25.5	170	7.5	21	0.9	768	33.9	
Postgraduate	94	4.2	26	1.1	7	0.3	127	5.6	

(*) Significant at the 0.05 level.

Cross-tabulation of the responses to forgetting to take a dose by age

An evaluation of the occurrence of the forgetting to take a dose with respect to the age variable shows that those that are between the ages of 18 and 50 years

are more likely to take the dose as soon as they remember when they miss a dose ($p = 0.000$; $\alpha = 0.05$) (Table 9). Overall, 58.1% of all of the respondents take the dose as soon as they remember while 9.9% double the next dose. These results show that the majority of

Table 9: Comparison of the responses to forgetting to take a dose by age

Variables	Responses to forgetting a dose										p		
	I take the dose as soon as I remember it		I double the next dose		I consult to my doctor/ pharmacist		I stop taking the medicine		Other			Total	
	Frequency.	%	Frequency.	%	Frequency.	%	Frequency.	%	Frequency.	%			
Age													
18–30	405	17.9	51	2.3	102	4.5	30	1.3	52	2.3	640	28.3	0.000*
31–40	314	13.9	49	2.2	128	5.7	23	1.0	32	1.4	546	24.1	
41–50	323	14.3	60	2.7	126	5.6	23	1.0	22	1.0	554	24.5	
51–64	194	8.6	41	1.8	90	4.0	23	1.0	22	1.0	367	16.2	
65±	78	3.4	21	0.9	47	2.1	3	0.1	8	0.4	157	6.9	

(*) Significant at the 0.05 level.

consumers engage in an irrational behavior when they forget to take the dose of a medication.

The behavior of checking the accuracy of prescription with respect to the conditions of taking medication for chronic illnesses or not

When the attitude on controlling the accuracy of the prescription is evaluated with respect to whether the individual has a chronic illness or not, it is seen that those with any kind of chronic illnesses control the accuracy of their prescriptions more often ($p = 0.026$; $\alpha = 0.05$) (Table 10).

Pharmacists' tendency to inform the patients about how to use the medicines with respect to age and gender

Another research finding is related to whether the pharmacist informs the prescription owner sufficiently enough. As shown Table 11, the findings indicate that the patients who are between 18 and 50 years of age are not well-informed by their pharmacists ($p = 0.022$; $\alpha = 0.05$).

Discussion

The RUMs is one of the issues which the world health systems have been prioritizing in their planning in recent years. National and international policies on the RUMs have been developed and consumer awareness on the RUMs has been tried to be raised. The RUMs is very critical for the health economy in terms of costs and important for health care because of its adverse effects on treatment plans of patients. At this point, it is important that the receivers of health care (patients, patient relatives, and general population) in addition to the policy-makers and service providers contribute to the promotion of RUMs by changing their attitudes and behaviors for the success of policy implementations.

The study was conducted in Ankara, the capital city of Turkey, and in Edirne, the pilot provinces in health-care services. Furthermore, this study is one of the rare studies conducted in more than one province in Turkey. The sample's power to represent the universe

and study results is thought to be important in reflecting the current situation in Turkey.

According to the results of this study, the rates of self-medication for the two cities are close to each other. In a study on the attitudes of general practitioners toward the RUMs in the treatment of elderly patients, it was found that doctors prescribe medicines without examining the patients in the majority of cases; they do not reveal their diagnosis to the patient and do not inform the patients about non-pharmacological treatments [25]. Physicians should be the most important source of information about rational drug use. According to the criteria for rational drug use, the prescribing physician should explain to the patient the instructions for the use of the drug, the possible side effects, in which case he should stop using the drug and the drug-food interactions.

In a study of the RUMs that were conducted at nine health centers and nine medical stations in Ethiopia, it was revealed that high rates of generic medicines were included in the prescriptions given at the health centers and medical stations and that analgesics were the most prescribed form of medicines. The same study also suggested that the prescription of antibiotics by health-care providers was at an unacceptable level and that people should be educated to prevent the irrational use of medicines [26]. Our study results are consistent with these findings.

These and similar irrational uses of medicines are common place not only in Turkey but also in other countries. In a study of three health centers in Cambodia, 330 prescriptions that were given were analyzed and it was found out that every prescription included 2.3 medicines on average; two generic medicines were generally prescribed; and most of the time, wrong medicine dosage, or incorrect medicines were included in the prescriptions. Based on these alarming results, the need for raising awareness on the RUMs was stressed [27]. In a study conducted in Brazil, it was stated that irrational drug use is quite common, especially among women [28]. In another study, prescriptions written at 21 first-step health institutions in Jordan were examined through a retrospective analysis using the WHO's indicators on the RUMs. The results of this study revealed that the use of prescribed generic medicines was very low; antibiotics were over-prescribed; and the irrational use of medicines was highly prevalent [29].

Table 10: Comparison of the habit of checking the accuracy of prescription with respect to the condition of taking medication for chronic illnesses

Variables	The habit of checking the accuracy of prescription						P
	Yes		No		Total		
	Frequency	%	Frequency	%	Frequency	%	
Taking medication for a chronic illness							
Yes	321	14.2	124	5.5	445	19.6	0.026*
No	1214	53.6	608	26.8	1822	80.4	

(*) Significant at the 0.05 level.

Table 11: Comparison of the pharmacists' tendency to inform the patients about how to use the medicines by age and gender

Variables	Does your pharmacist inform you about how to use the medicine you have purchased and make sure that you understand him/her correctly?						P
	Yes		No		Total		
	Frequency	%	Frequency	%	Frequency	%	
Age							
18–30	481	21.2	160	7.1	641	28.3	0.022*
31–40	438	19.3	109	4.8	547	24.1	
41–50	422	18.6	132	5.8	554	24.4	
51–64	298	13.1	69	3.0	367	16.2	
65±	133	5.9	25	1.1	158	7.0	
Gender							
Female	943	41.6	227	10.0	1170	51.6	0.004*
Male	829	36.6	268	11.8	1097	48.4	

(*) Significant at the 0.05 level.

Our study results indicate that consumer awareness of the RUMs is at a low level in Turkey and more effective consumer awareness campaigns are needed on this issue. Antibiotic use awareness research conducted in 12 countries selected by the WHO shows that antibiotic use is generally widespread and more prevalent especially among young people. In the same study, 25% of respondents think it is acceptable to use antibiotics that were given to a friend or family member, as long as, they were used to treat the same illness; 43% think it is acceptable to buy the same antibiotics, or request these from a doctor, if they are sick and antibiotics helped them get better when they had the same symptoms before. Both these actions can result in improper use of antibiotics, and therefore contribute to the resistance problem. About 32% of respondents think that they should stop taking antibiotics when they feel better, not when they have taken all of them as directed [30]. China has made a lot of efforts to improve the health system for the past 10 years. At the heart of this effort has placed rational antibiotic use. One of the most important efforts in rational antibiotic use in China has been identified as educating patients, caregivers, and the public [31] in Poland, although the use of antibiotics decreased after RUM policies, the knowledge level of the population was not sufficient. In addition, it was stated that the level of irrational use of antibiotics increases as the level of education decreases [32]. In a study conducted with patients benefiting from primary health care in Edirne Province, it was observed that a significant proportion of the patients were behaving irrationally. What is surprising here is that students and those with high levels of education exhibit more negative behavior. People with higher education and economic level seem to have a tendency in self-medication and irrational drug use [33].

In a study of keeping expired medicines at home conducted with the participation of 692 households, it

was determined that the participants kept medicines in bags or boxes until the end of their expiration dates and that the frequency of keeping expired medicines at home was high [34]. The findings of the present study are consistent with these previous findings.

In this study, which was conducted for the purpose of determining consumer attitudes and behaviors in the context of the RUMs campaign in Turkey that was led by the Ministry of Health, it has been found that the rate of consumers who have ever heard of the concept of RUMs is very low. In addition, it has been determined that their level of information about the RUMs is also not adequate. In this context, it is believed that the development of campaigns such as health literacy and the promotion of field works such as information campaigns conducted by employees of family practice and community health centers will be useful for the creation of awareness for the RUMs in the society.

Another interesting finding of the study was the decrease in the rate of self-medication as age increases. This result points out the need for the young people to be educated about the RUMs. In this context, it is believed that promoting educational programs at high schools and universities targeting young people will be beneficial. The research has found that both the rate of self-medication and the rate of reading prescriptions are higher for high school and university graduates compared to the other groups with regard to the education level. Substituting a more understandable language for complex medical terminology in the prescriptions could help consumers develop the habit of reading prescriptions. Appropriate arrangements could be planned to facilitate this outcome. According to the results of a study conducted with 500 participants in Serbia, the lowest level of knowledge for rational antibiotic use was 65 years and older. [35] However, in a study conducted in Norway, it was emphasized that the level of knowledge about rational antibiotic use was lower in young individuals [36].

As a result, it can be said that the level of knowledge about and the attitudes toward the RUMs of the consumers who have participated in our research are overall insufficient. It is observed that, in Turkey and around the world, administrations are taking the necessary precautions to promote the RUMs; however, improvement in this area has not been satisfactory thus far. More needs to be done. As a result of this study, it can be said that the strategies implemented within the context of the 2014–2017 National Action Plan for the RUMs have not been

sufficiently effective. More effective promotional activities toward particularly those social groups that are assumed to be medicine consumers should be undertaken. Different tools for different socio-demographic groups should be used for informing the society and creating awareness. In a study conducted in Nigeria, it was determined that the number of drugs used in interventions decreased as a result of the training related to drug use indicators [37]. In the study carried out for RUM in Sudan, it was emphasized that the number of inappropriate prescriptions and the rate of use of antimicrobial and herbal drugs without consulting a doctor is very high. Training programs are recommended to prevent these situations [38]. According to the results of a study in a military hospital in Nigeria, the use of antibiotics, wrong prescriptions, and the number of drugs per prescription was found to be quite high. For this reason, it is emphasized to increase training and research studies to prevent irrational drug use [39]. Nunan [40] argued that pharmacists in the developing countries play a critical role in supporting the RUM. Especially raising the awareness of the younger population by providing educational programs or adding subjects about the RUMs to school curriculums could be useful. Furthermore, developing applications which can be downloaded onto smartphones or tablets might be helpful in attracting the attention of the youth.

Another important finding of our research is about the pattern of throwing away medicines. When the significance of medicine expenses for individuals and the national health economy is considered, it would be beneficial if the underlying reasons behind throwing away medicines are investigated and the projects through which unused medicines are collected from consumers by various organizations to be reutilized are developed. Furthermore, it is important that consumers are advised about the efficient use of waste medicine containers placed at the family health centers.

It is important to integrate health 4.0 applications into the process to create a more effective process for RUM in the future. In this context, clinical decision support systems can be put into practice by creating symptom diagnosis appropriate drug algorithms for RUM, especially in primary health-care institutions. The use of generic drugs that have the same active ingredient, but are more economical, can also improve the pharmaceutical economy with the help of these algorithms. Pharmacists should take an active role in the process of RUM as well as physicians. Physicians and pharmacists should inform patients about the side effect. Daily drug dose applications should continue to be applied consistently. In addition, the necessary legislation and infrastructure should be established, and control systems should be provided to prevent non-prescription medicine use.

Due the time and financial restrictions, the current study covered a limited geographical scope by including only the cities of Ankara and Edirne in the field research. It is hoped that, by following the lead of this

study, the issue of the RUMs will be further explored from a broader perspective through surveys that are to be conducted in cities with different population profiles.

Conclusion

Our study results indicate that consumer awareness of the rational use of medicines is at a low level and more effective consumer awareness campaigns are needed on this issue.

References

1. Ruijter E, Orru RV. Multicomponent reactions opportunities for the pharmaceutical industry. *Drug Technol* 2013;10(1):15-20. <https://doi.org/10.1016/j.ddtec.2012.10.012> PMID:24050225
2. Le Grand A, Hogerzeil HV, Haaijer-Ruskamp FM. Intervention research in rational use of drugs: A review. *Health Policy Plan.* 1999;14(2):89-102. <https://doi.org/10.1093/heapol/14.2.89> PMID:10538724
3. Laing R, Hogerzeil H, Ross-Degnan D. Ten recommendations to improve use of medicines in developing countries. *Health Policy Plan.* 2001;16(1):13-20. <https://doi.org/10.1093/heapol/16.1.13> PMID:11238425
4. World Health Organization. The Pursuit of Responsible Use of Medicines: Sharing and Learning From Country Experiences; 2012. Available from: https://www.apps.who.int/iris/bitstream/handle/10665/75828/WHO_EMP_MAR_2012.3_eng.pdf. [Last accessed on 2019 Sep 11].
5. Rational use of medicines. *Lancet.* 2010;375(9731):2052. [https://doi.org/10.1016/S0140-6736\(10\)60944-0](https://doi.org/10.1016/S0140-6736(10)60944-0) PMID:20542156
6. Martin CB, Hales CM, Gu Q, Ogden CL. Prescription drug use in the United States, 2015-2016. 2019;334:1-8.
7. Turkish Pharmacists Union. Health, Drug and Pharmacy Statistics. Ankara, Turkey: Turkish Pharmacists Union; 2018.
8. World Health Organization. Medicines and Health Products Programme Strategic Framework 2016-2030. Geneva: World Health Organization; 2017.
9. Calikoglu E, Koycegiz E, Kosan Z, Aras A. Rational drug use and prescribing behavior of family physicians in Erzurum, Turkey. *Niger J Clin Pract.* 2019;22(5):626. PMID:31089016
10. Chaudhari VL, Mali SN, Dawari AV, Nishandar TB. Awareness about rational use of medicines among fresh bachelor of medicine and bachelor of surgery graduates. *J Educ Health Promot.* 2017;6:94. https://doi.org/10.4103/jehp.jehp_59_17 PMID:29114561
11. Değirmen N, Özyigit F. Evaluation of the awareness of midwifery students before and after on rational drug use and ethics education in pregnancy. *Pharm Chem J.* 2020;7(1):29-34.
12. Patrício KP, Alves NA, Arenales NG, Queluz TT. Teaching the rational use of medicines to medical students: A qualitative research. *BMC Med Educ.* 2012;12(1):56. <https://doi.org/10.1186/1472-6920-12-56>

- PMid:22812522
13. Nayir T, Okyay RA, Yesilyurt H, Akbaba M, Nazlıcan E, Acık Y, *et al.* Assessment of rational use of drugs and self-medication in Turkey: A pilot study from Elazığ and its suburbs. *Pak J Pharm Sci* 2016;29(4 Suppl):1429-35. PMid:27592477
 14. Yılmaz D, Altun N, Kılıç M. Determination of rational drug use behaviors of adult individuals—a cross-sectional study from Turkey. *Curr Health Sci J.* 2016;42(1):12-8. PMid:30568807
 15. Erdsiek F, Özcebe H, Üner S, Caman ÖK, Brand H, Czabanowska K, *et al.* Rational drug use and migration: Awareness and attitudes towards antibiotic use among adults in Turkey and Turkish migrants in Sweden, the Netherlands and Germany. *Eur J Public Health.* 2018;28(Suppl 1):cky047. <https://doi.org/10.1093/eurpub/cky047.076>
 16. Yu J, Fan Y, Wu R, Ji H. Investigation and analysis of rational drug use of residents in changshou district of Chongqing, China. *J Clin Nurs Res.* 2018;2(4):3767-9. PMid:30870490
 17. Mao W, Huang Y, Chen W. An analysis on rational use and affordability of medicine after the implementation of national essential medicines policy and Zero Mark-up Policy in Hangzhou, China. *PLoS One.* 2019;14(3):e0213638. <https://doi.org/10.1371/journal.pone.0213638>
 18. Sisay M, Mengistu G, Molla B, Amare F, Gabriel T. Evaluation of rational drug use based on World Health Organization core drug use indicators in selected public hospitals of eastern Ethiopia: A cross sectional study. *BMC Health Serv Res.* 2017;17(1):161. <https://doi.org/10.1186/s12913-017-2097-3>
 19. Aslam A, Khatoon S, Mehdi M, Mumtaz S, Murtaza B. Evaluation of rational drug use at teaching hospitals in Punjab, Pakistan. *J Pharm Pract Community Med.* 2016;2(2):54-7. <https://doi.org/10.5530/jppcm.2016.2.6>
 20. Mahmood A, Elnour AA, Ali AA, Hassan NA, Shehab A, Bhagavathula AS. Evaluation of rational use of medicines (RUM) in four government hospitals in UAE. *Saudi Pharm J.* 2016;24(2):189-96. <https://doi.org/10.1016/j.jsps.2015.03.003> PMid:27013912
 21. Gong Y, Yang C, Yin X, Zhu M, Yang H, Wang Y, Li Y, Liu L, Dong X, Cao S (2016) The effect of essential medicines programme on rational use of medicines in China. *Health policy and planning* 31 (1):21-27. <https://doi.org/10.1093/heapol/czv008>
 22. Allegaert K. Rational use of medicines in neonates: Current observations, areas for research and perspectives. *Healthcare.* 2018;6(3):115. <https://doi.org/10.3390/healthcare6030115> PMid:30223533
 23. Mendes LVP, Luiza VL, Campos MR. Rational use of medicines by individuals with diabetes mellitus and arterial hypertension in the municipality of Rio de Janeiro, Brazil/ Uso racional de medicamentos entre indivíduos com diabetes mellitus e hipertensão arterial no município do Rio de Janeiro, Brasil. *Cienc Saude Colet.* 2014;19(6):1673-85. <https://doi.org/10.1590/1413-81232014196.20372013> PMid:24897469
 24. Dogan M, Mutlu LC, Yılmaz İ, Bilir B, Saracoglu GV, Guzelant AY. Are treatment guides and rational drug use policies adequately exploited in combating respiratory system diseases? *J Infect Public Health.* 2016;9(1):42-51. <https://doi.org/10.1016/j.jiph.2015.06.002> PMid:26166817
 25. Akıcı A, Kalaça S, Uğurlu M, Çalı Ş, Oktay Ş. Pratisyen hekimlerin yaşlılarda akılcı ilaç kullanımı alışkanlıklarının değerlendirilmesi. *Türk Geriatr Derg.* 2001;4(3):100-5.
 26. Desta Z, Abula T, Beyene L, Fantahun M, Yohannes A, Ayalew S. Assessment of rational drug use and prescribing in primary health care facilities in North West Ethiopia. *East Afr Med J.* 1997;74(12):758-63. PMid:9557418
 27. Chareonkul C, Khun VL, Boonshuyar C. Rational drug use in Cambodia: Study of three pilot health centers in Kampong Thom Province. *Southeast Asian J Trop Med Public Health.* 2002;33(2):418-24. PMid:12236445
 28. Pons ES, Knauth DR, Vigo Á, Mengue SS. Predisposing factors to the practice of self-medication in Brazil: Results from the national survey on access, use and promotion of rational use of medicines (PNAUM). *PLoS One.* 2017;12(12):e0189098. <https://doi.org/10.1371/journal.pone.0189098> PMid:29220378
 29. Ootom S, Batieha A, Hadidi H, Hasan M, Al Saudi K. Evaluation of drug use in Jordan using WHO prescribing indicators. *East Mediterr Health J.* 2002;8(4):537-43. PMid:15603036
 30. World Health Organization. Antibiotic Resistance: Multi-Country Public Awareness Survey. Geneva: World Health Organization; 2015.
 31. He P, Sun Q, Shi L, Meng Q. Rational use of antibiotics in the context of China's health system reform. *BMJ.* 2019;365:l4016. <https://doi.org/10.1136/bmj.l4016> PMid:31227479
 32. Mazińska B, Strużycka I, Hryniewicz W. Surveys of public knowledge and attitudes with regard to antibiotics in Poland: Did the European antibiotic awareness day campaigns change attitudes? *PLoS One.* 2017;12(2):e0172146. <https://doi.org/10.1371/journal.pone.0172146> PMid:28212400
 33. Oztora S, Nepesova G, Caylan A, Dagdeviren HN. The practice of self-medication in an urban population. *Biomed Res.* 2017;28(14):6160-4.
 34. Göçgeldi E, Uçar M, Açikel CH, Türker T, Hasde M, Ataç A. Investigation of Frequency of Leftover Drugs at Home and Related Factors, *Prevent Med Bull.* 2009;8(2):113-8.
 35. Horvat OJ, Tomas AD, Kusturica MM, Savkov AV, Bukumirić DU, Tomić ZS, Sabo AJ. Is the level of knowledge a predictor of rational antibiotic use in Serbia? *PLoS One.* 2017;12(7):e0180799. <https://doi.org/10.1371/journal.pone.0180799> PMid:28700631
 36. Waaseth M, Adan A, Røen IL, Eriksen K, Stanojevic T, Halvorsen KH, *et al.* Knowledge of antibiotics and antibiotic resistance among Norwegian pharmacy customers a cross-sectional study. *BMC Public Health.* 2019;19(1):66. <https://doi.org/10.1186/s12889-019-6409-x> PMid:30646892
 37. Odusanya O, Oyediran M. The effect of an educational intervention on improving rational drug use. *Niger Postgrad Med J.* 2004;11(2):126-31. PMid:15300275
 38. Awad A, Ball D, Eltayeb I. Improving rational drug use in Africa: The example of Sudan. *East Mediterr Health J.* 2007;13(5):1202-11. <https://doi.org/10.26719/2007.13.5.1202>
 39. Adebayo E, Hussain N. Pattern of prescription drug use in Nigerian army hospitals. *Ann Afr Med.* 2010;9(3):152-8. <https://doi.org/10.4103/1596-3519.68366> PMid:20710106
 40. Nunan E. Rational use of medicines in developing countries. *J Pharm Pract Res.* 2017;47(1):6-7.