

Original Article



# The Effects of Health Literacy and Sociodemographic Characteristics on the Rational Use of Medication in Health Students: A Cross-sectional Study

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**Abstract**

**Background:** This study aimed to investigate the rational medication use of health students, their health literacy (HL), the associations of these factors with sociodemographic factors, and the contribution of HL to the rational use of medication (RUM).

**Methods:** Data for this cross-sectional study were collected from 1256 health students between February and June 2020 in Turkey, using a Sociodemographic Information Form, the Rational Medication Use Scale, and the Turkish version of the European HL Scale.

**Results:** The sociodemographic characteristics of the participants were not associated with their RUM. HL level was higher in the participants who were using medication regularly, those over the age of 20, and those with good income levels ( $P < 0.05$ ). The participants had a good level of HL ( $112.11 \pm 12.22$ ), and they used medications moderately ( $38.40 \pm 3.83$ ). The total score of HL and the score of understanding dimension of HL were associated with the RUM ( $P < 0.05$ ).

**Conclusion:** These findings provide a way to identify fallacies regarding rational medication use. There should also be continuous development of all dimensions of HL to maintain rational medication use behaviors. The findings obtained in this study provide basic data for educators and educational administrators to better support students with appropriate training programs to increase HL and rational medication use. A well-planned structured education program to provide information should be introduced urgently to raise the awareness of health students about the harmful consequences of irrational medication use.

**Keywords:** Health, Health literacy, Rational medication use, University students

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## Introduction

The irrational use of medicines is a major problem worldwide (1). The concept of rational use of medication (RUM) requires that individuals take the right dose of the correct medication for an adequate period to fulfill their individual needs at the lowest cost (2,3). RUM contributes significantly to high-quality healthcare provision, whereas irrational use has health risks and wastes resources in developing countries like Turkey (4). In the United States, for example, approximately 125 000 people with treatable conditions die each year because they do not take their medication properly (5).

The most common irrational medication use behavior is the self-administration of medications such as antibiotics and pain relievers without consulting healthcare professionals (2). Another irrational behavior is reliance on unofficial medication distribution networks in addition

to prescription medications. Irrational medication use is mainly a problem in underdeveloped countries where it is possible to buy over-the-counter medications in pharmacies, stores, and on the internet (2,3). The World Health Organization (WHO) reports that about 50% of all medications are used, distributed, or sold incorrectly, and 50% of patients do not use them as prescribed (1). Developing RUM requires developing comprehensive health literacy (HL) (information access, understanding, appraisal, and application) (3,6). However, even in developed regions like the US and those in the European Union, 50% of people have insufficient HL (7), while approximately 80.7% of people in Turkey are reported to lack HL (8).

Recent studies have reported that most university students use self-medication at an alarming rate (4,9). Most previous studies on RUM among health students have focused on antibiotic resistance and self-medication



(10,11). However, these studies have not considered HL and RUM together among health students (3,10).

Schools are in many ways ideal environments for health promotion and improvement. According to WHO reports, to promote RUM, it is necessary to identify the RUM training needs of undergraduate students and include problem-based pharmacotherapy training in their curricula (1). Additionally, RUM is among the action plans that should be carried out within the scope of protecting and improving the health of society in the 11th Development Plan of Turkey (2019-2023) (12). Students of health-related fields can lead community change by raising awareness and correcting misperceptions (6). Future healthcare professionals may partially increase RUM in society (13). Understanding whether participants' HL affects their RUM behaviors will help recognize possible risk factors and adopt interventions to address their specific needs (6).

Considering the abovementioned, this study aimed to determine the RUM and HL levels of university students studying in the fields of health, evaluate the relationships between their HL, RUM, and sociodemographic characteristics, and investigate the contribution of HL to RUM.

## Materials and Methods

### Design and Participants

This cross-sectional study was conducted on health students from February to June 2020. The university had approximately 1800 health students (future paramedics, in-home patient care technicians, elderly care technicians, disabled care and rehabilitation technicians, and physiotherapists). The link to the questionnaire was sent to these participants via WhatsApp groups. A pilot study was conducted with 15 students. The results were discussed by the research team. The pilot data were not included in the main analyses and were not presented in this study. There were no missing data. The sample size was calculated using the Raosoft sample size calculator, assuming a 50% response rate, with a 95% confidence interval and a 5% margin of error (14). This yielded an estimated sample size of 317. The study was conducted on 1256 students.

### Measurements

The data were collected using a Sociodemographic Information Form, the Rational Use of Medication Scale (RUM-S), and the European Healthy Literacy Survey (HLS-EU).

### Sociodemographic Information Form

This form included 8 questions about age, gender, economic status, presence of chronic diseases, medication use, and health-related habits.

### Rational Use of Medication Scale

The validity and reliability of RUM-S were tested by

Demirtaş et al (15). The scale includes 21 items to evaluate the RUM. Higher scores indicate higher levels of knowledge about the RUM. The Cronbach's alpha value of the scale was reported to be 0.79 (15). In the present study, the Cronbach's alpha value was calculated to be 0.72.

### European Health Literacy Survey

The 47-item HLS-EU was developed by Sørensen et al (16) and later simplified by Toçi et al (17). Aras and Bayık Temel developed a Turkish version of the scale using 25 items and confirmed its validity and reliability (18). The items of the scale are grouped into 4 dimensions: "Access to Information" with 5 items (items 1-5), with a total score ranging from 5 to 25, "Understanding Information" with 7 items (items 6-12), with a total score ranging from 7 to 35, "Appraisal/Evaluation" with 8 items (items 13-20), with a total score ranging from 8 to 40, and "Application/Using" with 5 items (items 21-25), with a total score ranging from 5 to 25. Therefore, the total score of the overall scale can range from 25 to 125. Lower scores indicate insufficient, problematic, or poor HL whereas higher scores indicate adequate or very good HL. The Cronbach's alpha value of the Turkish version of the scale was reported to be 0.92 (15,16), while it was 0.94 in our study.

### Data Analysis

The normal distribution of the data was evaluated. Then, the non-normally distributed data were evaluated using the Mann-Whitney U test and Pearson's correlation analysis. To evaluate the reliability of the scales used in this study, the Cronbach's alpha value was checked.

## Results

Table 1 shows the relationships between the participants' sociodemographic characteristics and their HL and RUM scores. The participants at or over the age of 20 had a significantly higher mean understanding dimension score than those under the age of 20 ( $P < 0.05$ ). Those with good income levels had significantly higher HL scores in the dimensions of access to information and using information ( $P < 0.05$ ). The participants who used medication regularly had significantly higher scores than non-users in understanding and applying information dimensions ( $P < 0.05$ ).

Table 2 shows the mean scores of the scales and correlations between the HL Scale and RUM Scale. For the HL Scale, the mean scores of all four dimensions were close to the maximum score: access ( $22.45 \pm 2.95$ ), understanding ( $31.62 \pm 3.61$ ), appraisal ( $35.72 \pm 4.47$ ), and application ( $22.30 \pm 3.01$ ). In contrast, the mean score of the RUM was  $38.40 \pm 3.83$ , indicating a moderate level. Participants with higher rational medication use scores also had significantly higher scores in all four HL dimensions ( $P < 0.005$ ).

The four HL dimensions (access, understanding, appraisal, and application) were moderately positively correlated ( $P < 0.005$ ) with RUM ( $r = 0.523$ ,  $r = 0.430$ ,

**Table 1.** Comparison of HLS-EU and RUM-S Scores by Sociodemographic Characteristics

No. (%)	Gender		Age Group		Living		Income		Regular Exercise		Chronic Disease		Regular Medication Use	
	Male	Female	17-20	≥20	With Family	Alone	Poor	Good	Yes	No	Yes	No	Yes	No
Overall score of HL, Mean ±SD	390 (31.1)	866 (68.9)	774 (61.6)	482 (38.4)	608 (48.4)	648 (51.6)	352 (28.0)	904 (72.0)	372 (29.6)	884 (70.4)	123(9.8)	1113 (90.2)	121 (9.6)	1135 (90.4)
	111.52 ±12.49	112.37 ±37	111.82 ±11.80	112.56 ±12.88	112.53 ±11.99	111.71 ±12.43	110.29 ±14.94	112.81 ±10.91	111.89 ±11.41	112.20 ±12.56	112.59 ±12.08	112.06 ±12.24	113.55 ±12.80	111.95 ±12.16
Access, Mean ±SD	22.44 ±3.03	22.45 ±2.92	22.40 ±2.87	22.53 ±3.08	22.54 ±2.91	22.36 ±2.99	21.93 ±3.57	22.65 ±2.64*	22.62 ±2.59	22.38 ±3.09	22.61 ±3.11	22.43 ±2.93	22.47 ±2.96	22.45 ±2.95
Understanding, Mean ±SD	31.44 ±3.69	31.70 ±3.57	31.58 ±3.44	31.69 ±3.87*	31.65 ±3.56	31.59 ±3.66	31.30 ±4.37	31.75 ±3.26	31.49 ±3.52	31.68 ±3.65	31.62 ±3.62	31.62 ±3.61	32.01 ±3.93*	31.58 ±3.57
Appraisal, Mean ±SD	35.45 ±4.51	35.84 ±4.45	35.61 ±4.43	35.91 ±4.54	35.86 ±4.41	35.59 ±4.53	35.32 ±5.21	35.88 ±4.14	35.68 ±4.19	35.74 ±4.59	36.25 ±4.45	35.67 ±4.47	36.23 ±4.53	35.67 ±4.47
Application, Mean ±SD	22.17 ±3.01	22.36 ±3.01	22.22 ±3.02	22.42 ±2.99	22.46 ±2.92	22.15 ±3.09	21.73 ±3.53	22.52 ±2.75*	22.09 ±3.04	22.39 ±2.99	22.07 ±2.79	22.33 ±3.03	22.83 ±2.99*	22.24 ±3.01
Overall score of RUM, Mean ±SD	38.38 ±4.17	38.40 ±3.67	38.29 ±4.03	38.583 ±3.48	22.45 ±2.95	31.62 ±3.61	22.45 ±2.95	31.62 ±3.61	38.60 ±3.17	38.31 ±4.07	37.87 ±4.73	38.45 ±3.71	38.38 ±3.56	38.40 ±3.86

Mann-Whitney U test was used to compare the categories of individuals distinguished by age-group, income, and chronic diseases (\* P<0.05).

r = 0.445, and r = 0.432, respectively). The RUM was also weakly positively correlated (r = 0.389; P = 0.005) with HL. Most students reported RUM (90.4%). The Cronbach's alpha values of the HL Scale and its sub-dimensions varied between 0.78 and 0.85 (access = 0.84, understanding = 0.82, appraisal = 0.85, and application = 0.78) while the Cronbach's alpha value of the total scale was 0.94. The Cronbach's alpha value of the RUM Scale was 0.72.

### Discussion

This study was designed to determine the relationship of sociodemographic characteristics of health students with HL and RUM and the effects of HL on RUM. The main finding of this study was that improving the access to information, understanding, evaluation, and application dimensions of HL had a moderate positive effect on RUM. Few sociodemographic variables had an effect on RUM and HL. It was seen that those over the age of 20 understood health-related information better, those with good income levels had better access to and use of information, and those who regularly used medications had higher HL.

Unlike some previous studies (11,19), no significant relationship was identified in this study between demographic characteristics (age, gender, and economic status) and RUM, including antibiotic use. This may reflect cultural differences associated with RUM. On the other hand, our findings agreed with previous studies (8,15) reporting that age, regular medication use, and good income level increased HL. The finding that the older participants of this study (over the age of 20) understood health information more easily than younger ones can be attributed to the health information, pharmacology, and internship training they had received in their first year of university education.

Previous studies have found that the reported prevalence of RUM varied depending on the sampled community. Several studies performed in the community reported low levels of RUM (50-60%) (20,21), whereas most health students had moderate RUM levels. Self-medication with antibiotics and analgesics is common among health students (22). Indeed, nearly two-thirds of university students in Turkey use antibiotics irresponsibly (20). Studies from other countries have reported contrasting results. For example, health students in Nepal, Slovenia, and India displayed high levels of RUM (12,21,23), whereas other studies reported only low or moderate RUM (7,11). Similarly, Gursul et al reported low RUM scores in Turkey. In this study, health students' RUM scores were good, and these differences may be due to the fact that health students pay more attention to the points to be considered in medication use (4).

Developing RUM depends on people being able to access, understand, evaluate, and apply health-related information effectively (15). Seeking information on issues such as smoking, obesity, healthy eating, and staying fit is among the prominent variables associated with access

**Table 2.** Rational Medication Use Scores by Health Literacy (HL) Total and Sub-dimension Scores; Cronbach Alpha Values

Health Literacy Scale	Mean ± SD	Min-Max	RUM (-)	RUM (+)	t	Cronbach's alpha	RUM score
			n (%) 121(9.6)	n (%) 1135(90.4)			
Access	22.45 ± 2.95	5-25	20.87 ± 4.09	22.621 ± 2.75	-6.26 *	0.84	0.523*
Understanding	31.62 ± 3.61	7-35	29.50 ± 5.65	31.85 ± 3.25	-6.92*	0.82	0.430*
Appraisal	35.72 ± 4.47	8-40	33.40 ± 6.98	35.97 ± 4.04	-6.08*	0.85	0.445*
Application	22.30 ± 3.01	5-25	21.07 ± 4.54	22.43 ± 2.77	-4.76*	0.78	0.432*
<b>HL Score</b>	112.11 ± 12.22	25-125	104.85 ± 19.75	112.88 ± 10.86	-6.99*	0.94	0.389*
<b>RUM Score</b>	38.40 ± 3.83	0-70				0.72	0.162*

\* $P < 0.005$ 

to information as a component of HL. Moreover, in the dimension of understanding information, the importance of the medication package insert, reading the prescription, and healthy living behaviors come to the fore. In this dimension, the participants of our study had sufficient scores. This study showed that they had adequate scores in the appraisal dimension, indicating that they were good at making the best choices about health, learning from their own and others' dangerous behaviors, and evaluating and deciding on the reliability of information sources (35.72 ± 4.47). It was seen that they had sufficient scores (22.30 ± 3.01) in the dimension of using information, covering topics such as following the recommendations of doctors, nurses, and pharmacists, screening and vaccination programs, and applying health information that is beneficial for them. This study confirmed the findings of a previous study on university students showing that HL plays an important role in individuals' access to and application of healthcare advice (19).

It was stated that people who are familiar with rational drug use have better HL (21). Students with good HL use their medications rationally (23). In contrast, the study by Elden et al on non-health university students in Egypt revealed that very few of the participants (7.8%) were aware of antibiotic resistance (10), but they had moderate RUM levels (3). In this study, although higher scores in all HL dimensions were associated with greater RUM levels as reported by Abacıgil et al (23), Sharma et al have asserted that this positive relationship is mostly due to the fact that students are good at understanding information (22). Abacıgil et al found that both patient- and population-based studies have reported that a poor understanding of Latin phrases reduces RUM levels (23). The findings of the aforementioned studies and the present study have indicated that RUM can be increased as long as health information is accessible, comprehensible, appraisable, and usable (10,23).

Although higher scores in all HL dimensions are associated with greater rational medication use, the positive relationship is mostly due to the fact that students are good at understanding information. Both patient- and population-based studies have found that

a poor understanding of Latin phrases reduces rational medication use (7,23). The findings of these studies and the present study indicate that rational medication can be increased as long as health information is understandable (6,23).

This study had some limitations. First, it relied on self-report data. This may have caused a bias. Second, it excluded students from several health-related departments, such as nursing or medicine. Therefore, it did not cover all health students such as those studying nursing, dentistry, or medicine. Third, because it had a cross-sectional design, it did not allow definite conclusions to be reached about the temporality of events. On the other hand, this study had some strengths. To begin with, it had a large sample size with no missing data. Moreover, the two scales showed high reliability. Besides, it is one of the rare studies in which RUM and HL were considered together, and unlike previous studies, this study addressed HL in terms of four dimensions including access information, understand information, evaluate information, and apply information.

## Conclusion

The findings of this research revealed that although health students had good levels of HL, they had moderate levels of RUM. HL was associated with some sociodemographic characteristics, but RUM was not associated with sociodemographic factors. HL was positively correlated with RUM. An increase in HL resulted in a moderate increase in RUM. The information and application dimensions of HL contributed more to RUM than the other dimensions did. HL knowledge explained 10.4% of rational medication use behaviors. An increase in HL knowledge increased the rational use of drug by 32.2%.

These findings will be helpful in identifying false or lacking behaviors regarding RUM and HL. It is important that future healthcare professionals, who will be responsible for teaching other people RUM, use their medications rationally. Furthermore, to maintain RUM behaviors, there should be continuous development of the access, understanding, appraisal, and application dimensions of HL. Additionally, the findings obtained in this research provide primary data for educators and



education executives to provide students with suitable training programs to increase their HL and RUM levels. In future studies, HL and RUM in health-related professions should also be addressed in other health student groups such as future physicians, nurses, and dentists.

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#### Author Contributions

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#### Conflict of Interests

The author has no conflict of interest to declare.

#### Ethical Permissions

The authors observed ethical issues (plagiarism, informed consent, misconduct, fabrication of data and/or falsification, dual publication and/or presentation, exuberance, etc). The study was approved by the Ethics Committee of Bartın University Social Sciences and Humanities (2020-SBB-0047). The questionnaire did not collect any identifying information, such as name, home address, telephone number, or social security number.

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