Health Literacy and Its Association with Knowledge and Antibiotics Self-inflected Use among Women in Zahedan: A Cross-Sectional Study

ABSTRACT

Background and Objectives: Antibiotics self-medication is a global concern, and more common especially in low-income countries, and cause problems such as antibiotic resistance and drug toxicity. This study examined the levels of health literacy (HL) and their association with the knowledge of antibiotics and its self-inflected use among women in Zahedan.

Materials and Methods: The present study was an analytic –descriptive study conducted on 400 women living in Zahedan from October 1 to November 25, 2021. The data collection method was self-explanatory. Antibiotics self-medication and the Health Literacy for Iranian Adults (HELIA) questionnaires were used to collect data. Chi-square and two-variable logistic regression test were applied using SPSS software version 19, (p= 0.05).

Results: Education had a higher correlation with the correct antibiotics consumption compared to the only knowledge (OR=2.812), and the higher levels of health literacy were related to correct antibiotics consumption (OR=0.480). Education level also had a significant relationship with the knowledge level regarding correct antibiotics consumption (OR=6.845). Furthermore, the domains of understanding (OR=1.035) and evaluation (OR=1.022) had a significant relationship with having a good knowledge.

Conclusion: The findings showed that at all levels of health literacy, the optimal level of knowledge and correct antibiotics consumption were low, and the level of health literacy supports proper knowledge about the correct antibiotics consumption, so it is suggested that the level of health literacy and knowledge be improved to increase the rational use of antibiotics presenting understandable content in educational programs of the national media.

Paper Type: Research Article

Keywords: Antibiotic resistance, Health Literacy, Knowledge, Public health, Self-medication

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Introduction

Medication, as one of the ways to expose the diseases, is as old as the history of human existence (1). Different patterns of incorrect drug use and not treating the disease cause long-term drug side effects. Today in Iran, one of the society's most significant health, economic and social problems is self-medication or excessive use of drugs that the country's pharmaceutical system is exposed to (2). Self-inflected drug consumption has economic, pathological, and physical consequences (3). Global self-medication with antibiotics (SMA) reaches alarmingly high rates, especially in low- and middle-income countries (2). A study in Dessie found that 55.3% of the participants used antibiotics without prescriptions (4). Scientific studies have revealed various prevalence rates of self-medication among Iranians. For example, the rate of self-medication among Iranians estimated in different studies was 31.1% (5), 44.8% (6), and 67.9% (7). Antibiotics have revolutionized modern medicine. This has resulted in higher life expectancies worldwide, as people are living approximately 30 years longer than they were in the early 20th century (8). However, over time, the antibiotics consumption has increased dramatically and has become the most widely used drug worldwide (9,10). A person tries to eliminate the symptoms of his illness or health problem without the help and opinion of professionals (11).

Based on WHO›s expectations, the antibiotic prescription rate for hospitalized patients is about 35%, and for outpatients is 10 % (12). Ignoring the rational use of medicine can have inappropriate consequences, such as patient dissatisfaction, prolongation, and the disease exacerbation (13). Unfortunately, the rate of self-medication in Iran is higher than the mean world rate (14). Iran ranks second among the top 10 countries worldwide regarding drug consumption (15).

According to the Ministry of Health, 83.3% of Iranian people have self-medication (16). Iranians consume about 339 drugs annually, 2-4 times more than international standards (17). Some medicinal products are usually available in pharmacies without a doctor›s prescription (18). Essential self-medication determinant factors were: previous experience with the disease (45.1%), assumption that the disease was not important (41.4%), cost of the physician's visit (28.6%), and availability of the drug (21.8%), similar prescription regarding the disease (19).

According to a study in public attitudes and beliefs about self-care, it indicated that those with better knowledge about this issue probably have more reasonable beliefs about the antibiotics use (20). Also, one way to deal with self-medication in different groups, especially women, is to transfer health knowledge and educate them about the unfortunate consequences of self-inflected drugs (3). Paying attention to the health literacy issue, as the ability of a person to obtain and understand the basic information of health services (21), is a crucial component. It has been introduced as a strong predictor of health (22). It is believed that health literacy is more related to people's general health compared to variables such as age, income, employment status, education level, and race (23,24). It is vital in people's decisions on their health needs (25).

Different groups show different behaviors toward drug use. Since females have sensitive periods such as pregnancy and breastfeeding, and more contacts with family members, and are their role models, paying attention to them is quite essential (26,27). Gender affects health and illness behaviors and they do not follow the same patterns. Women experience more stressful events, so the possibility of depression

and physical diseases is higher in women (28). They have a notable tendency to have self-inflected drug consumption. They use drugs to treat problems such as dysmenorrhea, relieve menopause symptoms, menstrual disorders, mood disorders, osteoporosis and problems during pregnancy, and their frequent breastfeeding (3). Antibiotics self-medication in women causes 3% of congenital abnormalities that causes severe family and social problems in both individuals and the society (29). The self-medication issue is related to all cultural, social, economic, and religious aspects of people, especially in developing countries. Nowadays, many people in Iran, in addition to the cases of medicine prescription by physicians, refer directly to pharmacies, and according to their diagnosis, which is often wrong, consume different drugs. Drug consumption in the country lacks a correct pattern, and the efforts made to correct it have not succeeded. The country's pharmaceutical system is still facing the problem of excessive and self-inflected drug consumption. Regarding these conditions, knowing the causes of self-medication and providing a solution to reduce them is particularly important (30). So, efforts should be made to find an effective solution and plan a correct drug consumption pattern to reduce the unnecessary consumptions. Since health literacy can provide valuable guidelines for creating interventions aimed at increasing the knowledge and ability of patients to recognize the effects of self-medication (31), and there was no comprehensive study on health literacy and its relationship with the self-inflected use of antibiotics among women in Sistan and Baluchistan province, this study tried to investigate the levels of health literacy (HL) and their association with knowledge of antibiotics and their self-inflected use among women in Zahedan.

Materials and Methods

Study design and setting

The present study was an analytic-descriptive study conducted among women aged 18 to 60 living in Zahedan, the capital of Sistan and Baluchistan province, Iran, from October 1 to November 25, 2021, using a drug self-inflected questionnaire. Zahedan is between 29.29 degrees latitude and 60.25 degrees longitude in the southeast of Iran and is 1372 meters above sea level. The population of this city is over 770,800 people, and the women's population is 330,065 with an area of 36,581 square kilometers.

Study sample

The study population is all women aged 18 to 60 living in Zahedan who refer to Comprehensive Health Service Centers (CHSC). The entrance criteria for this study were as not suffering from mental problems, literate, aged between 18 to 60 and living in Zahedan, and the exit criteria included the incomplete completion of the questionnaire.

According to the pilot study conducted in the same population in Zahedan, the percentage of adequate health literacy among the population aged 18 to 60 was 50%. Considering p=0.5, d=0.05, and a confidence level of 95%, the sample size was 384. To increase the study's accuracy, the researchers considered 400 people as the final sample size.

$$n = \frac{z^2 p(1-p)}{d^2}$$

The clusters sampling method was multi-stage. First, five geographical points of North, South, East, West, and the center of Zahedan were selected. Then, two CHSCs were randomly selected in each cluster, and 40 women between 18 and 60 were selected and included in the study from among the women referred to the centers.

Data collection tools

Health Literacy for Iranian Adults (HELIA): To measure participants' health literacy, the Health Literacy for Iranian Adults (HELIA) questionnaire was used. The health literacy questionnaire had two parts, including the respondents' demographic characteristics, including age, marital status, occupation, education level, income, and ethnicity and the main items part with 33 questions, access (6 items), reading skills (4 items), understanding (7 items), evaluation (4 items), and decision-making and use of health information (12 items). Its designers confirmed the questionnaire's validity through exploratory factor analysis (32). Also, the validity of the questionnaire had been evaluated by Zareban et al. once more (33) in the urban population of Baluchistan and reconfirmed. The reliability of the questionnaire using Cronbach's alpha was 0.85 for access area, 0.78 for reading skill, 0.88 for understanding, 0.79 for evaluation, 0.90 for decision-making, and 0.92 for the whole questionnaire. The criteria for measuring literacy was based on the Likert scale so that the study subjects expressed their opinions in 5 options (always=4, often=3, sometimes=2, rarely=1, never=0). The literacy score of a person was between 0 and 100, which was divided into four levels: inadequate (0-50), borderline (50.1-66), adequate (66.1-84), and excellent (84.1-100) (32).

Questionnaire of the Self-Inflected Use of Antibiotics: The researcher-made questionnaire on the self-administration of antibiotics was designed based on the purpose of the research and following the scientific literature. This questionnaire had two parts: 1) Knowledge about antibiotics (8 questions) and 2) The antibiotics taking behavior (8 questions). To achieve the psychometric criteria of the questionnaire, content validity, and reliability were used. The face and content validity of the self-inflected antibiotic questionnaire was conducted by ten experts (health education and pharmacist) in the form of an expert panel. Their comments were applied in this regard (CVR=0.68 – CVI=0.8). The reliability of the questionnaire was calculated using internal consistency and Cronbach's alpha. Cronbach's alpha value of the questionnaire was 0.86. The cases of difficulty level, inconsistency, and ambiguity were examined and corrected to determine the face validity by a qualitative method. The item impact method was used to estimate face validity quantitatively, and the impact rate of all items in the questionnaire was more than 1.5. In the exploratory factor analysis, 16 items were loaded into two factors, representing 59.05% of the observed changes.

The answers to the knowledge questions from questions 1 to 8 included two options, yes and no. The score for the favorable answer was one, and the score for the unfavorable answer was zero. A person's knowledge of the antibiotics score was between 0 and 8, divided into inadequate (0-4) and adequate (4.1-8).

The section on antibiotics self-reflected use had four questions with answers yes (0 points) and no (1 point), one question with answers always (2 points), sometimes (1 point) and rarely (0 points), and one question asking the number of times of antibiotic use and two questions asking people's recommending the antibiotics self-inflected use. A person's behavior of self-inflected antibiotics use score was between 0 and 6, divided into inadequate (0-3) and adequate (3.1-6). A trained public health expert student distributed the questionnaires. Before completing the questionnaires, the study objectives, the benefits of the study results in public health, and the time required to complete the questionnaire was explained to all the participants and the research team. Also, it was announced that

participation would be voluntary, withdrawal would be free at any time, confidentiality and anonymity would be guaranteed, and data would be published collectively. The questionnaires were delivered in person to the participants. The time required to complete the questionnaires were between 50 and 60 minutes.

Ethical Considerations

Before the questionnaire's delivery, the people's consent to participate in the survey was obtained. This research project approved by Zahedan University of Medical Sciences with project approval code IR.ZAUMS.REC.1400.239.

Statistical Analyses

A unique code from 1 to 400 was given to all questionnaires completed anonymously. The data were analyzed using SPSS software version 19. The normality of the distribution of quantitative observations was checked using the Kolmogorov-Smirnov normality test. Descriptive statistics were performed and presented in frequency, percentage, mean, and standard deviation. The chi-square test was used to compare the variables of age, education level, marital status, income, ethnicity, and occupation in health literacy levels. For regression analysis, the variable of knowledge related to antibiotics was sufficient (score greater than 4) and insufficient (score less than equal to 4), and the variable of antibiotics self-inflected use was sufficient (score greater than 3) and insufficient (score less than or equal to 3) were divided. Bivariate logistic regression analysis was performed to identify the relationship between various factors (age, education level, literacy level, health, marital status, income, ethnicity, and occupation) with sufficient knowledge of antibiotic use and the desired behavior of antibiotic use. Adjusted ORs and 95% CIs are also reported. The significance level in the present study was (p<0. 05).

Result

Characteristics of the participants

The mean and standard deviation of the participants' age were 35.97 ± 11.31 years, and they were in the age range of 18 to 60 years. The majority of women were married (87.50%). A number of 242 people (60.50%) had a university education, and mostly housewives (56%). 64.50% of the participants were at adequate and excellent health literacy levels, and 35.50% at borderline and insufficient levels. There was a statistically significant difference in health literacy levels based on different demographic characteristics (p<0. 05) Table 1.

Over half of the participants (50.50%) reported antibiotics self-inflected use during the last year.

20.80% reported that they experienced antibiotics three times or more than three times self-inflected use during the last year. Nearly one-third of the participants, 29.75%, never read the instructions for taking antibiotics. 51% of the participants did not receive their antibiotics according to the prescription, and only 49% were prescribed the antibiotic dosage by the doctor. Except for the variable of the number of times of antibiotics self-inflected use (p=0.782), there was a statistically significant difference in the use of antibiotics among women at four levels of health literacy (p□0. 05). For most participants (76.50%), the guidelines for taking antibiotics were not understandable (Table 2).

The knowledge of 67.50% and 31% of the participants regarding the best time to take antibiotics and the importance of taking antibiotics on time was inappropriate, respectively. 66.25% of women did not know the correct dose of antibiotics. 11.70% mistakenly thought that self-inflicted consumption leads to appropriate treatment. 57.25% wrongly stated that high-dose antibiotics lead to rapid recovery. Most participants (74.75%) mistakenly thought that

Table 1. Demographic characteristics and level of health literacy among the participants

Characteristics	Total (n=400)	Level of health literacy, n=400				Statistic	P value
		Inadequate n=80 (20%)	Borderline n=62 (15.50%)	Sufficient n=108 (27%)	Excellent n=150 (37.50%)		
Age							
18-27	97(24.25%)	8(10%)	22(35.48%)	34(31.48%)	33(22%)	χ^2=1.079	0.001
28-37	151(37.75%)	12(15%)	16(25.81%)	46(42.60%)	77(51.34%)		
38-47	83(20.75%)	20(25%)	10(16.13%)	19(17.59%)	34(22.66%)		
48-60	69(17.25%)	40(50%)	14(22.58%)	9(8.33%)	6(4%)		
Marital status							
Single	17(4.25%)	2(2.50%)	3(4.84%)	5(4.63%)	7(4.67%)	χ^2=19.08	0.024
Married	350(87.50%)	68(85%)	50(80.65%)	98(90.74%)	134(89.34%)		
Widow	15(3.75%)	8(10%)	4(6.45%)	2(1.85%)	1(0.66%)		
Divorced	18(4.50%)	2(2.50%)	5(8.06%)	3(2.78%)	8(5.33%)		
Education							
Lower than a university	158(39.50%)	76(95%)	30(48.39%)	30(27.78%)	22(14.66%)	χ^2=1.501	0.001
university degree	242(60.50%)	4(5%)	32(51.61%)	78(72.22%)	128(85.34%)		
Occupation							
Housewife	224(56%)	76(95%)	41(66.13%)	52(48.15%)	55(36.67%)	χ^2=9.687	0.001
Government employ	96(24%)	3(3.75%)	10(16.13%)	27(25%)	56(37.33%)		
Freelance job	34(8.50%)	0(0%)	1(1.61%)	11(10.18%)	22(14.67%)		
Student	46(11.50%)	1(1.25%)	10(16.13%)	18(16.67%)	17(11.33%)		
Income status							
Weak	64(16%)	43(53.75%)	12(19.35%)	6(5.56%)	3(2%)	χ^2=1.353	0.001
Medium	214(53.50%)	32(40%)	31(50%)	71(65.74%)	80(53.34%)		
Good	114(28.50%)	5(6.25%)	18(29.04%)	26(24.07%)	65(43.33%)		
Excellent	8(2%)	0(0%)	1(1.61%)	5(4.63%)	2(1.33%)		
Ethnic							
Baloch	142(35.50%)	56(70%)	25(40.32%)	37(34.26%)	24(16%)	χ^2=73.554	0.001
Sistani	212(53%)	23(28.75%)	30(48.39%)	52(48.15%)	107(71.33%)		
Others	46(11.50%)	1(1.25%)	7(11.29%)	19(17.59%)	19(12.67%)		

Table 2. Self-inflected use of antibiotics and level of health literacy among female participants

Antibiotic use	Total n (%)	Level of health literacy, n=400				$\chi 2$	P value
		Inadequate n (%)	Borderline n (%)	Sufficient n (%)	Excellent n(%)		
Self-inflected use of antibiotics during the last year						12.964	0.005
Yes	202(50.50%)	40(50%)	41(66.13%)	60(55.55%)	61(40.66%)		
No	198(49.50%)	40(50%)	21(33.87%)	48(44.45%)	89(59.34%)		
The number of times of self- inflected drug use in the last year						3.208	0.782
Once times	98(48.51%)	19(47.50%)	22(53.65%)	30(50%)	27(44.26%)		
Twice times	62(30.69%)	13(32.50%)	10(24.40%)	21(35%)	18(29.51%)		
Three times and more	42(20.80%)	8(20%)	9(21.95%)	9(15%)	16(26.23%)		
Do you read the instructions before taking ntibiotics?						1.046	0.001
Always	119(29.75%)	3(3.75%)	12(19.35%)	35(32.41%)	69(46%)		
Rarely	162(40.50%)	20(25%)	31(50%)	55(50.93%)	56(37.33%)		
Never	119(29.75%)	57(71.25%)	19(30.65%)	18(16.66%)	25(16.67%)		
Based on whose recommendation do you determine the amount of antibiotic dose?						60.987	0.001
Instructions	32(8%)	2(2.50%)	4(6.46%)	13(12.03%)	13(8.66%)		
Doctor's prescription	196(49%)	26(32.50%)	23(37.10%)	56(51.85%)	91(60.67%)		
Pharmacists' recommendation	27(6.75%)	4(5%)	7(11.29%)	8(7.40%)	8(5.33%)		
Recommendation of friends	51(12.75%)	26(32.50%)	9(14.51%)	6(5.56%)	10(6.67%)		
From internet	7(1.75%)	4(5%)	1(1.61%)	1(0.93%)	1(0.67%)		
Prior doctor's prescription	87(21.75%)	18(22.50%)	18(29.03%)	24(22.23%)	27(18%)		
Do you always change the dose of antibiotics arbitrarily?						32.419	0.001
Yes	103(25.75%)	37(46.25%)	20(32.26%)	27(25%)	19(12.67%)		
No	297(74.25%)	43(53.75%)	42(67.74%)	81(75%)	131(87.33%)		

Do you constantly change the type of antibiotic arbitrarily? Yes No	87(21.75%) 313(78.25%)	29(36.25%) 51(63.75%)	22(35.49%) 40(64.51%)	19(17.59%) 89(82.41%)	17(11.33%) 133(88.67%)	27.414	0.001
Do you understand the instructions for taking antibiotics? Yes No	94(23.50%) 306(76.50%)	58(72.50%) 22(27.50%)	18(29.03%) 44(70.97%)	9(8.33%) 99(91.67%)	9(6%) 141(94%)	1.473	0.001
Based on whose recommendation, have you taken antibiotics arbitrarily? Recommendation of friends Doctor Relatives Previous experience Prior doctor's prescription Pharmacist	25(12.38%) 23(11.39%) 20(9.90%) 59(29.21%) 74(36.63%) 1(0.49%)	11(27.50%) 1(2.50%) 6(15%) 11(27.50%) 11(27.50%) 0(0%)	3(7.32%) 4(9.75%) 9(21.95%) 14(34.15%) 11(26.83%) 0(0%)	5(8.33%) 8(13.33%) 3(5%) 20(33.33%) 23(38.34%) 1(1.67%)	6(9.83%) 10(16.40%) 2(3.28%) 14(22.95%) 29(47.54%) 0(0%)	33.512	0.004

Table 3. Knowledge of antibiotics and level of health literacy among female participants

Knowledge of antibiotic	Total n(%)	Level of health literacy, n=400				$\chi 2$	P value
		Inadequate n(%)	Borderline n(%)	Sufficient n(%)	Excellent n(%)		
Do you know the best time to take antibiotics? Yes No	130(32.50%) 270(67.50%)	5(6.25%) 75(93.75%)	16(25.81%) 46(74.19%)	41(37.96%) 67(62.04%)	68(45.33%) 82(54.67%)	39.125	0.001
Do you know the importance of taking antibiotics on time? Yes No	276(69%) 124(31%)	24(30%) 56(70%)	39(62.90%) 23(37.10%)	81(75%) 27(25%)	132(88%) 18(12%)	85.097	0.001
Do you know the common side effects of antibiotics? Yes No	221(55.25%) 179(44.75%)	14(17.50%) 66(82.50%)	26(41.93%) 36(58.07%)	67(62.03%) 41(37.97%)	114(76%) 36(24%)	78.690	0.001
Do you know the best dosage of antibiotics? Yes No	135(33.75%) 265(66.25%)	2(2.50%) 78(97.50%)	12(19.36%) 50(80.64%)	42(38.89%) 66(61.11%)	79(52.67%) 71(47.33%)	65.968	0.001
Does self-inflected use of antibiotics lead to correct treatment? Yes No	47(11.75%) 353(88.25%)	12(15%) 68(85%)	15(24.20%) 47(75.80%)	11(10.19%) 97(89.81%)	9(6%) 141(94%)	15.111	0.002
Does arbitrarily changing the type of antibiotics prescribed by the doctor cause incorrect treatment? Yes No	349(87.25%) 51(12.75%)	72(90%) 8(10%)	49(79.03%) 13(20.97%)	92(85.19%) 16(14.81%)	136(90.67%) 14(9.33%)	6.296	0.098
Does taking a high dose of antibiotics cause a quick recovery? Correct answer Incorrect answer	171(42.75%) 229(57.25%)	23(28.75%) 57(71.25%)	29(46.77%) 33(53.23%)	48(44.44%) 60(55.56%)	71(47.33%) 79(52.67%)	8.231	0.041
Does the use of low-dose antibiotics cause side effects? Correct answer Incorrect answer	101(25.25%) 299(74.75%)	16(20%) 64(80%)	22(35.48%) 40(64.52%)	29(26.85%) 79(73.15%)	34(22.67%) 116(77.33%)	7.215	0.301

the self-inflected reduction in antibiotic dosage does not have side effects (Table 3). Except for the variable of arbitrarily changing the type of antibiotic (p=0.098), there was a statistically significant difference in their knowledge about the antibiotics use at four levels of health literacy (p<0.05) (Table 3).

Based on the results of bivariate logistic regression, the level of participants' behavior concerning the correct use of antibiotics was

significantly higher with age. It was OR=2.99 CI: 1.50-5.96 in the age group of 38-47 years. However, only the age group of 28-37 years had a significant relationship with the level of a sound knowledge of antibiotics (OR=3.20 CI: 1.12-9.11). The participant's level of education showed a significant relationship with the level of behavior and knowledge in antibiotic use. The relationship between the level of education and a sound knowledge of antibiotics was stronger with the level of behavior in the correct use of antibiotics (OR=2.81CI: 1.26-6.24).

Housewives and self-employed women showed a significant relationship with the level of good knowledge of antibiotics. Compared to lower health literacy levels, participants with sufficient health literacy levels had a stronger statistical relationship with participants' behavior in correctly using antibiotics (OR=0.48 CI:0.24-0.92). Nevertheless, at this level, there was no correlation with the level of good knowledge (p=0.368). Education on the correct use of antibiotics had a significant relationship only with the level of good knowledge on the use of antibiotics (OR=6.84 CI: 4.21-11.10).

Among the areas of health literacy, the area of reading (OR=1.02 CI:1.00-1.03) and the area of decision-making and behavior (OR=1.03 CI:1.01-1.04) showed a statistically significant relationship with the level of behavior of correct use of antibiotics. The domain of understanding (OR=1.03 CI: 1.05-1.01) and the domain of evaluation (OR=1.02 CI:1.00-1.03) had a significant relationship with the level of good knowledge. Also, overall health literacy showed a statistically significant relationship with the level of behavior and good knowledge in the correct use of antibiotics, with (OR=1.05) and (OR=1.04), respectively. Other variables of marital status, household income status, and ethnicity did not have a statistically significant relationship with the level of behavior and knowledge in the correct use of antibiotics (p<0.05) (Table 4).

Table 4. Correlation between demographic, economic characteristics, and health literacy level with knowledge of antibiotics and self-use behaviors of antibiotics based on logistic regression results among participating women

Variables	Behavior of Self-inflected Antibiotics use (Score 0-6)		P-Value	OR(CI95%)	Knowledge of antibiotics (Score 0-8)		P-Value	OR(CI95%)
	Adequate (Score>3) n=255	Inadequate (Score≤3) n=145			Adequate (Score>4) n=169	inadequate (Score≤4) n=231		
Age								
18-27	61(23.93%)	36(24.83%)	0.027	2.069 (1.086-3.943)	55(32.54%)	42(18.18%)	0.057	3.025(0.966-9.467)
28-37	103(40.40%)	48(33.10%)	0.001	2.709(1.480-4.959)	74(43.79%)	77(33.33%)	0.029	3.202(1.125-9.111)
38-47	60(23.52%)	23(15.86%)	0.002	2.991(1.500-5.966)	33(19.53%)	50(21.65%)	0.083	2.662(0.881-8.049)
48-60	31(12.15%)	38(26.21%)	Ref		7(4.14%)	62(26.84%)	Ref	
Marital status								
Single	12(4.71%)	5(3.45%)	0.623	1.440(0.333-6.161)	9(5.33%)	8(3.46%)	0.152	0.299(0.057-1.559)
Married	227(89.02%)	123(84.83%)	0.830	1.12.(0.397-3.156)	146(86.39%)	204(88.32%)	0.128	0.398(0.121-1.302)
Widow	5(1.96%)	10(6.89%)	0.095	0.267(0.056-1.260)	3(1.77%)	12(5.19%)	0.357	0.393(0.054-2.861)
Divorced	11(4.31%)	7(4.83%)	Ref		11(6.51%)	7(3.03%)	Ref	
Education								
Lower than a university degree	83(32.55%)	75(51.72%)	0.011	2.812(1.267-6.244)	23(13.60%)	135(58.44%)	0.042	0.474(0.231-0.972)
University degree	172(67.45%)	70(48.28%)	Ref		146(86.40%)	96(41.56%)	Ref	

Occupation								
Housewife	126(49.41%)	98(67/59%)	0.851	1.086(0.461-2.556)	58(34.32%)	166(71.87%)	0.019	0.307(0.114-0.826)
Government employ	71(27.85%)	25(17.24%)	0.288	1.607(0.670-3.858)	63(37.28%)	33(14.29%)	0.122	0.444(0.159-1.242)
Freelance job	30(11.76%)	4(2.76%)	0.166	2.450(0.689-8.706)	14(8.29%)	20(8.65%)	0.004	0.166(0.049-0.562)
Student	28(10.98%)	18(12.41%)	Ref		34(20.11%)	12(5.19%)	Ref	
Income status								
Weak	21(8.24%)	43(29.66%)	0.113	0.064(0.007-0.562)	3(1.77%)	61(26.41%)	0.391	0.405(0.051-3.199)
Medium	143(56.07%)	71(48.96%)	0.251	0.290(0.035-2.402)	98(57.99%)	116(50.22%)	0.479	1.802(0.352-9.215)
Good	84(32.94%)	30(20.69%)	0.412	0.409(0.048-3.467)	64(37.87%)	50(21.64%)	0.444	1.901(0.367-9.851)
Excellent	7(2.75%)	1(0.69%)	Ref		4(2.37%)	4(1.73%)	Ref	
Ethnic								
Baloch	76(29.80%)	66(45.52%)	0.088	2.102(0.896-4.928)	44(26.03%)	98(42.42%)	0.099	1.904(0.752-4.256)
Sistani	152(59.61%)	60(41.38%)	0.065	2.084(0.956-4.544)	91(53.85%)	121(52.39%)	0.313	0.779(0.480-1.264)
Others	27(10.59%)	19(13.10%)	Ref		34(20.12%)	12(5.19%)	Ref	
Health literacy levels								
Inadequate	22(8.63%)	58(40%)	0.001	0.025(0.009-0.068)	5(2.96%)	75(32.46%)	0.011	0.223(0.070-0.709)
Borderline	26(10.20%)	36(24.83%)	0.001	0.092(0.042-0.203)	18(10.65%)	44(19.05%)	0.030	0.411(0.184-0.917)
Sufficient	80(31.37%)	28(19.31%)	0.028	0.480(0.249-0.924)	54(31.95%)	54(23.38%)	0.368	0.765(0.427-1.371)
Excellent	127(49.80%)	23(15.86%)	Ref		92(54.44%)	58(25.11%)	Ref	
Antibiotics training								
Yes	78(30.59%)	40(27.59%)	0.640	1.113(0.712-1.740)	87(51.48%)	31(13.42%)	0.001	6.845(4.219-11.105)
No	177(69.41%)	105(72.41%)	Ref		82(48.52%)	200(86.58%)	Ref	
Domains of health literacy								
Reading	251(100%)	149(100%)	0.025	1.020(1.002-1.037)	169(100%)	231(100%)	0.137	1.014(0.996-1.023)
Accessing	251(100%)	149(100%)	0.957	1.001(0.980-1.022)	169(100%)	231(100%)	0.065	0.980(0.959-1.001)
Understanding	251(100%)	149(100%)	0.264	1.008(0.994-1.023)	169(100%)	231(100%)	0.001	1.035(1.019-1.053)
Appraisal	251(100%)	149(100%)	0.692	1.003(0.988-1.018)	169(100%)	231(100%)	0.003	1.022(1.007-1.038)
Decision-making and behavior	251(100%)	149(100%)	0.001	1.030(1.015-1.045)	169(100%)	231(100%)	0.739	0.998(0.983-1.012)
Total health literacy	251(100%)	149(100%)	0.001	1.052(1.040-1.064)	169(100%)	231(100%)	0.001	1.049(1.036-1.062)

Discussion

The findings show that at all levels of health literacy, the optimal level of knowledge and correct behavior of antibiotic use was low. This contradiction is caused by the pandemic of the coronavirus disease in the society under study because people avoid visiting crowded and contaminated places such as medical centers and hospitals due to the fear of the coronavirus and try to self-medicate and use antibiotics. They had available antibiotics. The studies conducted during the coronavirus outbreak indicated an increase in the antibiotics self-inflected use (34-37), and the most important reasons for self-inflected use by these people could be the speed of transmission and the severity of the disease known all over the world (37).

The results of Jirjees' study showed that 20-40% of people self-medicated with antibiotics

due to saving time, fear of covid infection, lack of time, and knowledge (38), which is in line with the results of our study.

Heshmatifar's study on the attitude of 360 women, 41% evaluated self-medication as harmless (39). In Niriayo's study, ease of access to medicines, feelings that the disease is minor, and time-saving were the reasons for self-medication (27). In a study in Egypt, it was reported that 53.6% out of 160 participants believed that the primary motivation behind self-medication was to save money (40). In Storla's study, self-medication was seen more in females, so the study in females is more important (29).

It seems that in the studied society, one of the main reasons for the high arbitrary use of antibiotics was the people's avoidance of attending various gatherings. They feared of suffering from the corona disease or spreading it to others. The economic problems and the some drugs availability were also considered as the further reasons.

One of this study's findings was the level of education of the participants, which had a significant relationship with the level of behavior and knowledge in antibiotic use. In most cases, more knowledgeable people use antibiotics only when a doctor prescribed them.

In the study of Bonyani, high levels of education were also mentioned as prevention of self-inflected drug use (41), which is in line with the present study. However, in Grigoryan's analysis, the rate of self-inflected use of antibiotics was higher in people with high education (42), which could be due to increased awareness about antibiotic drugs and how to use them without consulting a doctor.

Marital status, household income status, and ethnicity had no significant relationship with the level of behavior and knowledge in correct use of antibiotics. Nevertheless, the income status of the household is directly related to self-medication. Alipour's study (43) found no correlation between demographic characteristics such as employment status and gender with self-inflicted drug use. Still, the higher economic status was a factor that reduced self-inflected drug use among the participants. It sounds that the populations under study and their demographic characteristics led to differences in the reported results.

One of the important reasons for people to self-medicate and not go to the doctor is their economic status. There is a significant difference in the use of antibiotics at four levels of health literacy among the participants so a high percentage of the samples did not have adequate information about the best time of taking antibiotics. The majority of participants did not have correct knowledge about the correct dosage. More than half of the participants mistakenly thought that high-dose antibiotics would lead to rapid recovery, and majority of women thought that arbitrary doses reduction of antibiotics did not have side effects. A study conducted by Aya Mostafa in Egypt among 508 patients showed that patients do not have information about the dosage, effect duration, and drugs side effects (44) that is consistent with the present results. Due to the lack of education and knowledge about the use of antibiotics, including the lack of information about the time of use, dosage, side effects, and self-inflected of not taking antibiotics led to an increase in drug resistance and consequently increased costs. If drug resistance develops, stronger antibiotics will be needed, and the cost will increase (45, 46). It seems that one of the causes of people's lack of knowledge about the correct use of antibiotics is the lack of reading the antibiotic use guide. If the consumers read the antibiotic use guide, it improves health indices. However, among the studied population, the guide to antibiotic use

was not understandable that indicates the need to review the preparation of an understandable guide in the correct use of antibiotics.

However, the level of awareness of the studied population could not be understood for reasons such as not reading the antibiotics guidelines usage. There is a regular and structured program for education about the correct use of antibiotics through health centers, radio and television, and universities of medical sciences. It shows the need to revise, in a simple and understandable language, a comprehensible guide for the correct use of antibiotics, design and implementation of educational interventions in increasing awareness of the proper use of antibiotics through health centers, pharmacies, radio, television, universities, health ambassadors, and volunteers.

In this study, among the domains of health literacy, the domains of reading, decision-making, and behavior showed a significant relationship with correct use of antibiotics. However, two domains of understanding and evaluation had a significant relationship with good knowledge. Also, overall health literacy showed a statistically significant relationship with good behavior and knowledge of antibiotics correct use.

In Alqarni's study, a positive and significant correlation was observed between health literacy and the correct use of medicine. Health literacy can strengthen people's cognitive abilities in acquiring, understanding health information, problem-solving, and adequately using healthcare services (31). It can be stated that health literacy causes people to make more accurate judgments about various healthcare measures, including drug use, and examine its advantages and disadvantages before taking action.

A study by Khaleghi and Shahid showed that health literacy is more related to people's general health than variables such as age, income, employment status, education level, and race (23,24). Rahmati et al. found a significant relationship between the prevalence of self-medication with education and health literacy. The highest frequency of self-medication was among illiterate people with primary education (47). However, the study of Ehsani et al., and Kouhpayeh and colleagues had a discrepancy (48-49). Its possible causes could be the influence of factors that determine health and disease, the cultural characteristics of the studied community, the number of samples, and the difference in the type of health literacy measurement tool.

More evidence is needed to examine the relationship between health literacy and the knowledge and correct behavior of antibiotic use. Improving the level of health literacy, and taking into account multiple determining factors may contribute to vast improvements in health, including the correct and rational use of antibiotics, an improvement that is greatly needed by society.

Strengths and Limitations of the Study: Due to the current study's cross-sectional nature, it was impossible to investigate the causal relationship between the level of health literacy and the antibiotics knowledge, and the correct use of antibiotics. Sampling in an accessible way might have caused selection bias, so it may not accurately reflect the women views living in Zahedan. On the other hand, the appropriate sample size and lack of non-response or missing data in the present study can strengthen the validity of the present study's findings.

The self-reporting method and anonymous questionnaires minimized the interviewer's bias and prevented the respondents from being influenced by the category of social desirability. Although self-reporting may cause recall bias in some answers. To minimize this limitation, the standard questionnaire on health literacy in Iranian society, as well as the items to check

the knowledge and antibiotics use that were used in similar studies, was used. Despite these limitations, the study of women, who constitute a large part of the population and have a dynamic and influential role in maintaining and ensuring the family's health and society, seems vital, especially in a country where self-inflected use of antibiotics is common. Considering their central role in the family, women can play an effective role in preventing self-inflected consumption.

Conclusions

More than half of the samples had antibiotics self-inflected use. In all levels of health literacy, the optimal level of knowledge and correct behavior of antibiotics consumption was low, which is a sign of weakness in the relevant educational programs. On the other hand, people had a better level of knowledge about the correct use of antibiotics by receiving appropriate training in the proper use of antibiotics through public health campaigns, training through caregivers, health volunteers, and radio and television programs.

The findings showed that adequate health literacy supports appropriate knowledge about the correct use of antibiotics, so it was suggested to improve the level of health literacy and programs to increase awareness of the rational use of antibiotics with comprehensible content in educational programs of the national media. In addition, public health awareness programs on the correct use of antibiotics, along with national policies to control access and rational and scientific prescribing of antibiotics, are highly recommended.

Several interventions, including public health campaigns, stricter laws on drug dispensing from pharmacies, and improvements in healthcare performance and availability, may be necessary to change people's health behaviors and protect them from risks. Since low health awareness and literacy are one of the most critical problems for both developing health policies and promoting healthy behaviors, it is recommended that efforts be made to acquire these skills along with plans that promote public health.

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