

# Comparative Evaluation of Rational Antibiotic Use in Non-Physician Healthcare Professionals and Laypersons

## ABSTRACT


**Objective:** Antibiotic resistance is a serious public health problem caused by the incorrect and excessive use of antibiotics. The aim of this study is to compare the habits, knowledge and attitudes towards antibiotic use among non-physician healthcare professionals and lay people


**Methods:** This cross-sectional study, conducted in a family medicine clinic between November 2023 and January 2024, involved 329 participants aged 18-65 years, including non-physician healthcare workers and people visiting the clinic for various reasons. Participants were given a 13-item questionnaire to assess antibiotic use and a 19-item "Antibiotic Use Scale".

**Results:** The mean age of the participants was  $37.89 \pm 11.16$  years. It was found that demographic characteristics such as gender, age, marital status, education level, income level, and tobacco and alcohol consumption had no significant effect on attitudes towards antibiotic use. The study showed that healthcare workers and people who preferred to visit a healthcare facility for upper respiratory tract infections tended to have more negative attitudes towards antibiotic use ( $p=0.021$  and  $p<0.001$  respectively).

**Conclusion:** The results highlight the need for healthcare professionals to be more cautious in the use of antibiotics and underline the importance of comprehensive education and awareness programs for the general population. Considering that demographic characteristics do not have a significant impact on attitudes towards antibiotic use, educational efforts in this area should be accessible and effective for everyone.

**Keywords:** Antibiotic resistance, antibiotic use, attitudes of healthcare professionals, cross-sectional studies

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## INTRODUCTION

Antibiotic resistance, which results from the inappropriate and excessive use of antibiotics, is one of the greatest challenges facing modern medicine.<sup>1</sup> Research shows that the unnecessary prescription of antibiotics and their inappropriate use by patients leads to microorganisms developing resistance to these drugs.<sup>2</sup> This situation leads to insufficient efficacy in the treatment of disease and poses a serious risk to public health, while also placing an economic burden on healthcare systems.<sup>3</sup> Therefore, the rational use of antibiotics is a critical issue that requires a multidisciplinary approach involving the education and awareness of both healthcare professionals and the general public. An effective awareness and education program can help in the treatment of disease and in the reduction of public health risks.<sup>3</sup>

The first step in the fight against this global problem is, of course, prescribing the right antibiotic to the right person, but only when necessary. In particular, doctors can develop strategies to prevent the unnecessary use of antibiotics by reviewing their prescribing practices.<sup>4</sup> On the other hand, healthcare professionals in the community should take the lead on antibiotic use and prioritize educational activities. These professionals play a crucial role in promoting the correct use of antibiotics both in the healthcare sector and among the general public. Through education and awareness programs, healthcare professionals can reduce the resistance problem caused by the incorrect use of antibiotics and achieve more effective health outcomes.<sup>5</sup> Healthcare professionals play a critical role in patient care and are often the first point of contact with patients. This group serves as an important bridge on issues such as patient education, medication management and disease prevention strategies. However, unlike physicians who prescribe antibiotics, healthcare professionals are among the recipients of antibiotics, similar to the general population. Consequently, the knowledge, attitudes and practices of this group in relation to antibiotic use can have a significant impact on overall health outcomes. As role models, healthcare professionals are primarily responsible for educating the population by demonstrating proper antibiotic use themselves.

The aim of our study is to compare the habits,

knowledge and attitudes of non-physician healthcare professionals with regard to the use of antibiotics with those of people who are not healthcare professionals.

## MATERIALS AND METHODS

### *Research design and location*

This study was conducted from November 2023 to January 2024 at the Family Medicine Clinics of Mengücek Gazi Training and Research Hospital and Maçka Ömer Burhanoglu State Hospital. Participants included volunteers aged 18-65 years who were cognitively able to read and understand the survey questions and who had visited the clinic for any reason, as well as non-physician healthcare professionals. Physicians and individuals who refused to participate in the study were excluded.

### *Data collection instruments*

Participants were given a 13-item questionnaire on demographic information and antibiotic use prepared by the researchers following a literature review, and the 19-item "Antibiotic Use Scale", developed by Atik and colleagues, in face-to-face interviews in their own language. The Antibiotic Use Scale is a Likert scale with 19 items and three sub-dimensions (attitude, subjective norm and intention). The maximum score that can be achieved with the scale is 95, and a higher score indicates a negative attitude towards antibiotic use. The Cronbach alpha reliability coefficients of the scale were .90 for the total scale, .70 for the attitude sub-dimension, .91 for the subjective norm sub-dimension and .86 for the intention sub-dimension.

### *Sample size*

The sample size calculation was based on the study "Sample size in factor analysis" by MacCallum and colleagues. The total of 32 questions in the survey was based on 10 participants per question. It was planned to interview at least 320 participants in total.

### *Ethical approval and informed consent of participants*

The study was approved by the Ethics Committee for Clinical Research of the University of Erzurum Binali Yıldırım with decision number 2023-19/2. In addition, verbal and written informed consent was obtained from participants prior to participation in the study.

### Data analysis

Data analysis was performed using IBM SPSS Statistics 23 (IBM SPSS Corp., Armonk, NY, USA). The normal distribution was tested using the Kolmogorov-Smirnov test and descriptive statistics were calculated. Statistical tests used included the Mann-Whitney U test and the Kruskal-Wallis test. The level of statistical significance was set at  $p < 0.05$ .

### RESULTS

A total of 329 participants were included in the study, of whom 48.9% ( $n=161$ ) were non-physician healthcare professionals and 51.1% ( $n=168$ ) were lay people. The mean age of the participants was  $37.89 \pm 11.16$ , with 53.5% ( $n=176$ ) male and 46.5% ( $n=153$ ) female. Further demographic data of the participants can be found in Table 1.

**Table 1.** Demographic Data of Participants

		n	%
Where he/she lives	Provincial	188	57.1
	Center		
	District center	105	31.9
	Village	36	10.9
Marital status	Married	223	67.8
	Single	100	30.4
	Divorced	6	1.8
Education	Primary	28	8.5
	Highschool	83	25.2
	University	218	66.3
Perceived income level	Bad	18	5.5
	Intermediate	230	69.9
	Good	81	24.6
Smoking status	Yes	96	29.2
	No	214	65.0
	Quit	19	5.8
Alcohol use status	Yes	18	5.5
	No	299	90.9
	Quit	12	3.6
Presence of chronic disease	Yes	69	21.0
	No	260	79.0

**Table 2.** Comparison of independent variables and participants' scores from the antibiotic use scale

		n	Mean	Std. Error	p
Gender	Male	176	74.70	15.69	0.470*
	Female	153	77.30	11.59	
Where he/she lives	Provincial	188	75.99	13.48	0.589**
	Center				
	District center	105	76.10	15.27	
Marital status	Village	36	74.92	12.83	
	Married	223	76.73	13.45	0.254**
	Single	100	74.28	15.16	
Divorced	6	72.50	11.36		
Education	Primary	28	73.61	14.59	0.414**
	Highschool	83	73.58	17.38	
	University	218	77.09	12.26	
Perceived income level	Good	81	77.85	12.42	0.271**
	Intermediate	230	75.45	14.45	
	Bad	18	73.00	14.20	
Smoking status	Yes	96	75.33	14.68	0.933**
	No	214	76.15	13.65	
	Quit	19	76.11	14.58	
Alcohol use status	Yes	18	74.44	14.78	0.894**
	No	299	76.16	13.65	
	Quit	12	71.92	20.45	
Presence of chronic disease	Yes	69	75.20	14.60	0.799*
	No	260	76.10	13.83	
Profession	Medical staff	161	79.58	11.19	<0.001*
	Other	168	72.39	15.43	

\*Mann Whitney U test, \*\*Kruskal Wallis test

The mean score obtained by the participants on the antibiotic use scale was  $75.91 \pm 13.98$ . The item with the highest score was  $4.45 \pm 0.84$  for "I would accept antibiotics from a friend for cold, flu and sinusitis" and the item with the lowest score was  $3.66 \pm 1.11$  for "My parents think it is right to take antibiotics for cold, sinusitis and flu to get well" (Figure 1).



**Figure 1.** Participants' answers to the Antibiotic Use Scale items

Participants were asked if they would seek medical advice for colds, sinusitis or flu. 49.2% (n=162) said no, while 50.8% (n=167) said yes. The mean score on the antibiotic use scale was 73.66 in the group that said no and 78.23 in the group that said yes, and a statistically significant difference was found between them ( $p = 0.021$ ). A comparison of the scores obtained on the scale with other independent variables is shown in Table 2. No significant association was found between participants' demographics, chronic disease status, smoking and alcohol consumption and the score they received on the antibiotic use scale. Only healthcare professionals scored significantly higher on the scale than lay people ( $p < 0.001$ ).

## DISCUSSION

This study compared the habits, knowledge and attitudes towards antibiotic use between non-healthcare professionals and non-healthcare workers. The results indicate that healthcare workers have a more negative attitude towards the use of antibiotics. This contradicts the widespread assumption that healthcare professionals know more about antibiotics and are more cautious about their use.

The rather negative attitude of healthcare staff towards the use of antibiotics could indicate that the training and information they receive on the subject is inadequate. This situation calls for more effective implementation of educational programs and awareness-raising activities in this group. Although it is expected that healthcare professionals will be more aware of the prescription and use of antibiotics, the results of this study contradict this expectation. This is consistent with the findings of Salsgiver and colleagues, who also found that healthcare professionals have inadequate knowledge and misconceptions about antibiotic use.<sup>7</sup> In addition, the study by Morgan and colleagues (2017) emphasizes the need to educate healthcare professionals about the incorrect and unnecessary use of antibiotics.<sup>8</sup>

Another reason for the negative attitude of healthcare workers towards antibiotic use observed in our study could be due to professional relationships and interactions within the healthcare sector. The close relationships that healthcare workers have with physicians and the convenience that these relationships provide could influence antibiotic prescribing. This could mean that it is easier for

healthcare professionals to obtain antibiotic prescriptions than the general public and that more interactions occur. Indeed, such dyadic relationships and interactions could contribute to inappropriate use of antibiotic prescriptions and consequently to negative attitudes. This issue has been highlighted in the literature, suggesting that easier access to physicians by healthcare professionals may lead to more frequent and sometimes unnecessary antibiotic prescribing.<sup>9</sup>

When examining the results of the antibiotic use scale, a significant difference was found between those who visited a doctor and those who did not ( $p = 0.021$ ). This suggests that access to healthcare services can influence people's attitudes towards antibiotic use. Misconceptions and expectations about antibiotic use can increase the demand for antibiotics and lead to more visits to the doctor.<sup>10</sup> Addressing this challenge for physicians includes educating patients, improving their own attitudes and knowledge, effective communication skills, and active participation in antibiotic stewardship programs. These approaches can help to change patients' negative attitudes towards antibiotic use and combat antibiotic resistance.

In our study, no significant association was found between demographic characteristics such as gender, place of residence, marital status, education level, income level, smoking or alcohol consumption, chronic diseases and antibiotic use scale scores. This result indicates that attitudes towards antibiotic use are shaped independently of these demographic factors. This result is consistent with the study by Taylor et al. (2016), which found that attitudes towards antibiotic use are similar across a wide range of demographics. Furthermore, these results suggest that demographic characteristics do not play a decisive role in antibiotic use and that a more general societal awareness or lack of education could be influential. This observation was also made in the study by Wells et al. (2018), which mentioned that demographic factors have a limited influence on attitudes towards antibiotic use. The results of this study underline the need for a general approach, independent of demographic characteristics, to improve attitudes and awareness of antibiotic use.

While there are studies in the literature that suggest that demographics influence attitudes towards antibiotics, there are also studies that show no

effect.<sup>11-13</sup> The reasons for this could include differences in the scales used and differences in healthcare systems between countries. Our study points to the need for comprehensive antibiotic awareness and education programs targeting the entire population, regardless of demographic characteristics.

Our study has some limitations. Firstly, due to its cross-sectional design, the generalizability of the findings is limited. Therefore, further studies in populations with different geographical or socio-economic conditions are required. Secondly, the study being conducted in a healthcare institution and the self-selection of patients may have introduced biases. Community-based studies that include healthy volunteers could be more informative.

## CONCLUSION

This study compared the attitudes and knowledge levels regarding antibiotic use among non-physician health personnel and individuals not working in health care. The more negative attitudes towards antibiotic use among health personnel suggest a need to enhance the effectiveness of current education and awareness programs. The findings reveal that demographic factors do not have a decisive impact on attitudes towards antibiotic use, highlighting the need for a general societal awareness and education. This study can aid in developing strategies to improve attitudes and awareness levels regarding antibiotic use and contribute to the fight against antimicrobial resistance.

**Ethics Committee Approval:** The study was approved by the Erzincan Binali Yıldırım University Clinical Research Ethics Committee with decision number 2023-19/2.

**Informed Consent:** Verbal and written consent was obtained from participants prior to their participation in the study.

**Peer-review:** Externally peer-reviewed.

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