



Investigation of the Public Knowledge Level about Rational Antibiotic Use

Akılcı Antibiyotik Kullanımı Hakkındaki Halkın Bilgi Düzeyinin Araştırılması

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Abstract

Aim: Antimicrobial agents are among the most commonly used medications in the community. They are also the drug group with the highest rate of misuse. The purpose of this study was to investigate the level of public knowledge regarding antibiotic drug use.

Material and Method: This study was conducted from November 6, 2022, to November 26, 2022, with the participation of 459 individuals aged 18 years and older. Participants completed an 11-question questionnaire that was distributed via the internet.

Results: The proportion of females was 75.8%, and 64.7% of participants were between the ages of 18-24. 17.9% of participants reported using leftover antibiotics from a previous prescription when they became ill again, while 19.4% of participants visited a hospital and requested antibiotic prescription from a doctor. The analysis revealed no statistically significant relationship between the use of antibiotics left in the box and the status of applying to the hospital for antibiotic prescription, gender, the way of accessing health-related information, and studying or graduated from medicine ($p>0.05$).

Conclusion: The fact that there is no positive difference between those who have received health education and others in terms of antibiotic use shows that educational activities on this issue should be carried out for everyone, including all levels of society. In addition, it would be beneficial to expand all these activities in the Internet-based environment, considering the high rate of people accessing health-related information through the Internet.

Keywords: Public health, antibiotic resistance, information

Öz

Amaç: Toplumda en çok kullanılan ilaçlar arasında antimikrobik ajanlar bulunmaktadır. Bu ilaçların aynı zamanda yanlış kullanım oranı en fazla olan ilaç grubu olduğu da bilinmektedir. Bu çalışmadaki amacımız, halkın antibiyotik ilaç kullanımı hakkında bilgi düzeyini araştırmaktır.

Gereç ve Yöntem: Bu çalışma 06.11.2022-26.11.2022 tarihleri arasında 18 yaş ve üzeri 459 kişinin katılımı ile gerçekleştirildi. Katılımcılar internet üzerinden gönderdiğimiz 11 soruluk anketi cevapladılar.

Bulgular: %75,8'inin kadınların oluşturduğu katılımcı popülasyonunun %64,7'si 18-24 yaş aralığındadır. Katılımcıların %17,9'u bir sonraki hatalıklarında kutuda arta kalan antibiyotikleri kullandıklarını ifade ederken %19,4'ü hastaneye müracaat ederek doktordan antibiyotik reçete etmesini istemiştir. Kutuda arta kalan antibiyotiklerin kullanımı ve antibiyotik reçete etmek için hastaneye müracaat etme durumunun cinsiyet, sağlık ile ilgili bilgilere ulaşma şekli ve sağlık bölümlerinde okuma veya mezun olma arasında anlamlı düzeyde ilişki bulunmamıştır ($p>0.05$).

Sonuç: Sağlık alanında eğitim alanlar ile diğerleri arasında antibiyotik kullanımı açısından olumlu yönde bir farkın olmaması bu konudaki eğitici faaliyetlerin toplumun tüm katmanlarını içerecek şekilde herkese yönelik yapılması gerektiğini ortaya koymaktadır. Ayrıca, sağlık ile alakalı bilgileri internet üzerinden ulaşan kişilerin oranının yüksekliği göz önünde bulundurulduğunda tüm bu faaliyetlerin sanal ortamda da yaygınlaştırılmasının faydalı olacağı değerlendirilmiştir.

Anahtar Kelimeler: Halk sağlığı, antibiyotik direnci, bilgi



INTRODUCTION

Antibiotics are a diverse group of structural and molecular entities unified by their capacity to inhibit microbial growth at high concentrations, rather than a distinct class of molecules viewed from an anthropocentric perspective. The original usage of the term 'antibiotic' was merely a generic term reflecting the outcome of a laboratory test.^[1] In modern usage, antibiotic refers to a low molecular weight molecule categorized as narrow-spectrum or broad-spectrum according to its natural, semi-synthetic, and synthetically produced spectrum of activity, utilized to inhibit bacterial growth (bacteriostatic) or kill them (bactericidal), and encompasses a wide range of chemical substances.^[2] The intensive use and misuse of antibiotics are undoubtedly the primary factors linked to the high prevalence of resistant pathogenic and commensal bacteria worldwide. Both the amount and manner in which antibiotics are administered contribute to the selection of resistant strains. However, other social, environmental, and genetic factors influence the direct relationship between use and the frequency of resistance.^[3] The overuse of antibiotics has been reported in both community and hospital settings globally, particularly in developing countries.^[4] It is reported that antibiotics are the most commonly used drugs in Turkey, accounting for approximately 20% of the market value of drugs.^[5] Antimicrobial use is the most critical determinant of resistance development. Many essential parameters for rational antimicrobial therapy have been defined. Maximum treatment efficacy should be combined with minimum toxicity at the lowest cost. The quality of antimicrobial use depends on knowledge of various aspects of infectious diseases. In terms of efficacy, many of our indications for antimicrobial use need to be critically evaluated. Irrational use should be discouraged. Preventing the development of resistance is a quality parameter that requires more attention.^[6] High levels of antibiotic consumption increase the levels of bacterial resistance that threaten public health. However, antibiotics still provide highly effective treatments for common diseases with a significant impact on human health. The challenge for public education is to achieve a significant reduction in unnecessary antibiotic use without compromising the treatment of bacterial infections.^[7] Antimicrobial agents are among the most widely used drugs. At the same time, they are the most misused group of drugs. Our aim in this study was to investigate the level of public knowledge about the use of antibiotics.

MATERIAL AND METHOD

This study was conducted online from November 6th to November 26th, 2022, with participation from 459 individuals over 18 years old who completed questionnaires. The online data collection form consisted of two sections related to basic sociodemographic data and antibiotic use characteristics. In the initial section, sociodemographic characteristics, including age, gender, academic status (i.e., whether the individual was currently studying or had previously graduated from a medical programme), and smoking status, were investigated with

regard to their association with demographic characteristics. The second section of the questionnaire inquired about the sources of health-related information, the individuals who recommended the use of antibiotics, and general knowledge about antibiotics and their mechanism of action. This study was evaluated by the ethics committee of Health Sciences University Hamidiye Medical Faculty at its meeting dated October 14th, 2022, and found ethically appropriate.

RESULTS:

Of the 459 participants, 75.8% were female and 48.6% were between the ages of 18-24 years. Other sociodemographic and general information about antibiotic use of the participants are shown in **Table 1**.

Table 1. Demographic distribution and general information about antibiotics		
	N	%
Gender		
Women	348	75.8
Men	111	24.2
Age		
18-24 y	223	48.6
25-34 y	81	17.6
35-44 y	98	21.4
45 y and older	57	12.4
Studying or graduated from medicine		
Yes	162	35.3
No	297	64.7
Current smoking		
Yes	95	20.7
No	348	75.8
Quit smoking	16	3.5
How to access health-related information		
Internet	113	24.6
By applying to health institutions	344	74.9
Who recommends your antibiotics?		
Medical doctor	450	98.0
Pharmacist	5	1.1
Others	4	0.9
What is the mechanism of action of antibiotics?		
Reduce fever	9	2.0
Protect from disease	18	3.9
Reduce pain	13	2.8
Reducing inflammation by killing microbes	400	87.1
No idea	19	4.1
What is the duration of antibiotic use?		
Until the box ends	117	25.5
As prescribed by the doctor	307	66.9
Until the complaints are gone	32	7.0
Until fever reduces	3	0.7
Antibiotics are effective against viruses		
Yes	136	29.6
No	246	53.6
No idea	77	16.8
Do you use leftover antibiotics from the medicine box without consulting a doctor?		
Yes	82	17.9
No	377	82.1
Did you admit the hospital and ask the doctor to prescribe antibiotics?		
Yes	89	19.4
No	370	80.6

The analysis revealed no significant relationship was found between gender, access to health-related information, studying or graduated from medicine and the use of leftover antibiotics in the medicine box without consulting a doctor ($p > 0.05$) (Table 2).

Table 2: Comparison of the increased use of antibiotics without consulting a doctor with gender, access to health-related information and studying or graduated from medicine

	Gender		P value	
	Women	Men		
Do you use the remaining antibiotics without consulting the doctor?	Yes	57 (16.4)	25 (22.5)	0.141
	No	291 (83.6)	86 (77.5)	
Access to health information				
	Internet	By applying to health institutions		P value
Do you use the remaining antibiotics without consulting the doctor?	Yes	25 (22.1)	55 (16)	0.136
	No	88 (79.9)	289 (84)	
Studying or graduated from medicine				
	Yes	No		P value
Do you use the remaining antibiotics without consulting the doctor?	Yes	26 (16)	56 (18.9)	0.453
	No	136 (84)	241 (81.1)	

Table 3 also illustrates the comparison of gender, access to health-related information, studying or graduated from medicine with the status of applying to the hospital and prescribing antibiotics to the doctor.

Table 3: Comparison of gender, the way of accessing health-related information and the status of studying or graduated from medicine on the status of going to the hospital and prescribing antibiotics to the doctor

	Gender		P value	
	Women	Men		
Did you admit to the hospital and ask the doctor to prescribe antibiotics?	Yes	67 (18.3)	22 (19.8)	0.895
	No	281 (80.7)	89 (80.2)	
Access to health information				
	Internet	Applying to health institutions		P value
Did you admit to the hospital and ask the doctor to prescribe antibiotics?	Yes	22 (19.5)	65 (18.9)	0.893
	No	91 (80.5)	279 (81.1)	
Studying or graduated from medicine				
	Yes	No		P value
Did you admit to the hospital and ask the doctor to prescribe antibiotics?	Yes	27 (16.7)	62 (20.9)	0.276
	No	135 (83.1)	235 (79.1)	

DISCUSSION

In this study, we examined the level of knowledge about antibiotic use in a population of 459 individuals. The discovery of antibiotics is considered one of the most significant medical advancements of the last century.^[8] Antibiotics are substances that kill or inhibit the growth of microorganisms causing infectious diseases, either found in nature or synthesized partially or entirely in a factory,^[9] and save millions of lives annually by preventing many infectious complications when used appropriately.^[10] Their development has been the most critical advance in preventing, controlling, and curing serious infections.^[11] However, the widespread

and indiscriminate use of these drugs,^[12] along with poor practices related to disease prevention and control, has led to the development of resistance in many microorganism strains worldwide, resulting in antibiotic resistance, which is defined as the ability of microorganisms to resist the action of antimicrobial agents and occurs when an antibiotic loses its effectiveness in inhibiting bacterial growth.^[13] The relationship between antibiotic consumption and resistance is well-documented at spatial and temporal scales in hospitals, nursing homes, primary healthcare facilities, and communities, as well as across countries.^[14] In the absence of next-generation antibiotic development, appropriate use of existing antibiotics is essential to ensure long-term availability of effective treatment for bacterial infections.^[15] Rational drug use involves prescribing the appropriate drug at the right dose at the right time.^[16] Irrational antibiotic use is a persistent global public health issue that warrants increased attention. The World Health Organization (WHO) estimates that more than 50% of all medicines globally are inappropriately prescribed, dispensed, or sold.^[17] If antibiotics become ineffective, established and emerging infectious diseases can lead to increased morbidity, healthcare utilization, and premature mortality.^[18] A study conducted by Botan et al. in 2015 on 154 adults aged 18 and above who applied to a family health center in Van's city center found that 24.5% of women and 33.3% of men requested antibiotic prescription when consulting a doctor for any reason, but there was no statistically significant difference between genders.^[19] Similarly, a study by Baydar Artantaş et al. involving 257 adults who applied to hospital family medicine outpatient clinics found that 55.8% of those using antibiotics without examination for conditions like influenza, colds, and flu were women and 44% were men; additionally, 55.6% of those prescribing antibiotics without patient consent or buying antibiotics without prescription were female and 44.4% were male.^[20] A study by Napolitano F et al. in 2013 involving 419 individuals investigating Italian population knowledge, attitudes, and behaviors regarding antibiotics found no significant relationship between gender and antibiotic use without prescription.^[21] In our study, when evaluating participants based on gender variables, 16.4% of female participants and 22.5% of male participants stated they used increased antibiotics without consulting doctors. Additionally, 18.3% of female participants and 19.8% of male participants stated they went to the hospital and requested antibiotic prescription from doctors. Similar to previous studies,^[20,21] it was concluded that inappropriate antibiotic use behaviors were more common among male participants than female participants. In a study by İlhan et al. conducted in February 2006 among 2696 individuals aged 18 and above who applied to five primary healthcare centers where Gazi University's Faculty of Medicine conducted education and research activities, it was found that 17% of women, 8% of men, and 21.2% of men self-administered antibiotics; a significant relationship was observed between

male gender, being single, having secondary school or higher education, being employed, and not having social security.^[22] In our study, 16.7% of participants who studied in medicine or graduated from medicine stated they used increased antibiotics without consulting doctors and 16.7% stated they requested antibiotic prescription from doctors by going to the hospital; while 18.9% of participants who did not study in medicine or graduate from medicine stated they used increased antibiotics without consulting doctors and 20.9% stated they requested antibiotic prescription from doctors by going to the hospital. Today, individuals are expected to have skills to access health-related information, use health services correctly, and take responsibility for their own health to protect and improve health. To achieve this expectation, individuals need sufficient health literacy to access and understand health information and communicate with healthcare providers during diagnosis, treatment, rehabilitation, and health protection processes.^[23] With the development and integration of mobile Internet and mobile phones, tablet computers, and other mobile terminals, people can now search for health information online regardless of time or place, allowing them to solve unexpected health problems. Therefore, the Internet and its various applications have become increasingly integrated into daily life.^[24] In our study, 22.1% of participants who accessed health information via the internet stated they used their antibiotics without consulting their doctors; 19.5% stated they requested antibiotic prescription from doctors by going to the hospital; while 16% of those who accessed health information by applying to healthcare institutions stated they used their antibiotics without consulting their doctors; and 18.9% stated they requested antibiotic prescription from doctors by going to the hospital. When examined in percentage terms, we can comment that access to health information via the internet increases inappropriate antibiotic use behavior. As health-related information becomes increasingly accessible to the public, it is essential to evaluate the quality of accessible resources such as the internet in disseminating information about antibiotics and their appropriate use.^[25] Antibiotics have been one of the most important discoveries that have transformed human health quality by preventing life-threatening bacterial infections; however, as resistance to existing antibiotics continues to increase, it will be necessary to develop new agents with new targets or mechanisms of action. The combination of currently available antibiotics may continue to be useful in treating resistant pathogens; however, it is likely that physicians will run out of options in the future. Several experimental molecules exist in the literature and are being considered for clinical development. There is no doubt that as antibiotic resistance increases worldwide, physicians and industry alike will face great challenges in finding new products to continue the antibiotic miracle long into the future. Every effort must be made today to preserve and optimize the agents in our treatment arsenal.

CONCLUSION

Upon evaluating the participants in our study based on gender, we found that 16.4% of female participants and 22.5% of male participants reported using antibiotics without consulting a physician. Additionally, 18.3% of female participants and 19.8% of male participants stated that they visited the hospital and requested antibiotic prescription from healthcare providers. Upon examination of gender variables, we found that inappropriate antibiotic use behaviors were more prevalent among male participants compared to female participants, although no significant correlation was observed between these parameters. In our study, no significant association was identified between having studied in medicine or graduated from medicine and inappropriate antibiotic consumption or requesting antibiotic prescription. However, when examined as a percentage, we noted that the awareness levels of participants who had studied in medicine or graduated from medicine were higher than those of other participants. Furthermore, when analyzed as a percentage, we observed that access to health information via the internet is associated with increased inappropriate antibiotic use behavior. Given the increasing accessibility of health-related information to the public, it is essential to evaluate the role of variable quality accessible sources, including the internet, in disseminating information about antibiotics and their appropriate use.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was evaluated by the ethics committee of Health Sciences University Hamidiye Faculty of Medicine at its meeting dated 14.10.2022 and was found ethically appropriate.

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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