

Public Knowledge and Attitudes Regarding Antibiotic Use in Ankara, Turkey

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ABSTRACT

Objective: Turkey is one of the countries with the highest antibiotic consumption per capita and suffers widespread antimicrobial resistance. However, few studies are measuring the knowledge, attitude and behaviour regarding antibiotic use in Turkey. We aimed to describe the awareness, knowledge, beliefs, attitude and behaviour of the society regarding antibiotic use and antimicrobial resistance.

Materials and Methods: The study was carried out at a large shopping mall with 60 000-75 000 visitors daily in the capital city of Turkey, Ankara. We applied a questionnaire to the visitors who accepted to participate for two days. The data were collected on demographics, knowledge, attitude and beliefs concerning antibiotic use and awareness of judicious antibiotic use (JAU) and related factors.

Results: Of the 1044 people who attended the study, 554 were male (52.1%). The average age of the participants was 37.7. JAU was found to be high (10/10 points) in 127 participants (12.2%). JAU was statistically high among people who were informed about the potential harms of inappropriate antibiotic use by physicians ($p < 0.001$), who had university degree ($p = 0.005$), who did not use antibiotics without prescriptions ($p < 0.001$), and who did not use antibiotics within the last year ($p < 0.001$).

Conclusion: Awareness and knowledge about JAU in Ankara were low. There are misbeliefs and inappropriate attitudes in terms of antibiotic use and antimicrobial resistance. Necessary precautions should be taken immediately to improve this issue.

INTRODUCTION

The discovery of antibiotics has been a milestone for the treatment of infectious diseases. However, soon after antimicrobials came into use, it has been recognized that microorganisms become resistant. Antimicrobial resistance decreases the number of treatment options available in infectious diseases. Currently, antimicrobial resistance has become an issue that concerns the human health (1). Data from various countries reporting high levels of resistance to fundamental antibiotic groups is growing (2). It has been estimated that because of resistant bacteria, about 700 000 people die annually in EU countries alone, and the annual cost related to antimicrobial resistance is 1.5 billion Euros. In 2050, it is expected that resistant microorganisms will become the most common cause of death by killing 10 million people annually (3).

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Antimicrobial resistance is closely related to inappropriate antibiotic use (1-3). Besides the role of physicians, the knowledge, beliefs and behaviour of patients play a role in inappropriate antibiotic use (4). Studies conducted in different settings have shown that inappropriate behaviours regarding antibiotic use are over 50% (5). On the other hand, endeavours to raise awareness among physicians and the public can seriously reduce inappropriate antibiotic use (6).

Surveillance studies showed that Turkey is one of the countries with the highest antibiotic consumption per capita and suffers widespread antimicrobial resistance (7,8). Few studies are measuring the knowledge, attitude, and behaviour of the public regarding antibiotic use in Turkey (9). This study is conducted in Ankara to determine public awareness related to judicious antibiotic use (JAU) and antimicrobial resistance.

MATERIALS AND METHODS

The study was carried out on March 18 and 19, 2017 at a large shopping mall with 60 000-75 000 visitors daily, in the capital city of Turkey, Ankara.

HIGHLIGHTS

- Turkey is one of the countries with the highest antibiotic consumption per capita and suffers widespread antimicrobial resistance.
- Judicious antibiotic use (JAU) was found to be high in only 12.2% (127/1044) of the participants.
- 24.3% of participants demand antibiotics when they visit a physician. Of these, 83.5% have reported that the physicians complied with their demands.
- 67.5% of participants were aware of the term of antibiotic resistance while 117 (17.1%) of these could not link antibiotic use and the development of resistance.
- The main source from where the participants heard the term of antibiotic resistance was the internet (n=348, 51.03%).
- High level of education and being informed about the possible harms of antibiotic use were found to be related to JAU.

Through face-to-face interviews, a questionnaire was applied to 1044 consenting adult (age > 18) participants. The survey consisted of 19 questions: Eight for demographic variables, ten for assessing the knowledge, attitude and behaviour on antibiotic usage, and 1 for awareness of antimicrobial resistance (supplemental material). The participants who correctly answered all 10 questions that measured knowledge, attitude and behaviour were scored high and considered as judicious antibiotic users. The factors affecting JAU were determined on this base.

The data obtained from the questionnaires were recorded on a standard sheet and statistically analyzed by SPSS 11.5. The chi-square test was used for comparisons of categorical variables, and continuous variables were analyzed with the t-test. A logistic regression model was generated with including variables which were found to be significant in univariate analysis. Statistical significance was set as $p < 0.05$.

Permission was obtained from the Ankara University School of Medicine Ethical Committee for the study. All participants were informed, and we obtained their written consents.

RESULTS

The demographics and independent variables were summarized in table 1.

Among the participants, 127 (12.7%) people were found to have a JAU score of 10. A monthly income of > 5000 TL, being a health care worker, the higher level of education and cultural status were related to a high JAU score. Other characteristics of participants affecting JAU were given in table 2.

The number of participants who used antibiotic at least once in the last year was 665 (63.7%) while 139 (13.4%) used more than three courses of antibiotics (Table 1). People who used more than three courses of antibiotics were tended to use antibiotics without prescription (OR:2.51, 95%CI:1.74-3.63, $p < 0.001$).

Of the 1044 participants, 203 (19.4%) indicated that they stopped taking antibiotics when their

Table 1. The characteristics of participants (N=1044)

Characteristics	N (%)
Age, mean (Min-Max)	37.7 (18-72)
Sex	
Male	544 (52.1)
Female	500 (47.9)
Occupation	
Healthcare worker	56 (5.4)
Other	988 (94.6)
Education Status	
Elementary school	85 (8.2)
High school	335 (32.2)
University	620 (59.6)
Monthly income	
<5000 TL	715 (68.5)
People living in the same house	
>4	77 (16.9)
Books read per year	
>9	376 (37.4)
Daily newspaper readers	872 (83.8)
Number of antibiotics used within last year	
0	379 (36.3)
1-3	525 (50.3)
>3	139 (13.4)
Antibiotic use without prescription	287 (27.6)
Education about antibiotics*	169 (16.2)
Informed by their health care providers regarding the possible harms of antibiotic use	363 (34.9)

* Participating in an educational activity about antibiotics (such as taking a lecture, attending a conference, lesson at school).

complaints subsided and not completed the entire course of treatment as recommended by their physicians. A small number of participants (n=98, 9.4%) have stated that they have given their leftover antibiotics to other people. The number of people who used antibiotics without visiting a physician was 280 (27.2%).

One hundred seventeen (11.5%) of the participants were thinking that antibiotics had no harmful effects. Possible harmful effects of antibiotics were stated as organ damage (n=224, 29%), various

health problems such as gastrointestinal disturbances (n=150, 19.5%), and development of antibiotic resistance (n=135, 17.5%) by the remaining 927 participants.

Two hundred forty-nine (24.3%) of the participants reported that they demanded a prescription for antibiotic during the visit with their physician. Of those, 208 (83.5%) reported that the physician fulfilled their request. One hundred twelve (10.8%) of the participants have reported that they are taking antibiotics for fever, 206 (19.7%) have reported the same for sore throat and 79 (7.5%) for runny nose. One hundred (9.5%) participants have reported that they have used antibiotics on the recommendations of their acquaintances with no medical training. One hundred thirty-two (12.7%) have reported that they have recommended the use of antibiotics to others that they thought were sick.

Six hundred eighty-four (67.5%) of the participants have reported that they have heard the term of antibiotic resistance. The most common source of this information was the internet for 348 of the participants (51.1%). Among the people who heard of antibiotic resistance, 117 (17%) did not know that inappropriate antibiotic usage caused resistance. All health care workers correctly stated that inappropriate antibiotic usage might lead to antimicrobial resistance.

In the multivariate analysis; being informed by physicians about the possible harms of inappropriate antibiotic usage, having a university degree, using antibiotics with prescription only, and no antibiotic use within the last year were found to be significantly related to JAU (Table 2).

DISCUSSION

Judicious use of antibiotics is defined as using antibiotics only when needed for infections for an appropriate duration, at an appropriate dose, and at the lowest cost possible considering individual characteristics (10). In Turkey, with the most antibiotic usage per capita amongst OECD countries, it is determined that at least 35 out of every 100 prescriptions included an antibiotic (8). Indeed, 63.7% of our participants have reported using antibiotics

Table 2. Analysis of the characteristics affecting Judicious Antibiotic Use

Variable	Number of subjects with a JAU score of 10 N= 127 (%)	Univariate Analysis			Multivariate Analysis*		
		OR	%95 CI	P value	OR	%95 CI	P value
Age (average)	39,4	1.52	0.55-4.43	0.93	NA	NA	NA
Sex Female	70 (55,1)	0.87	0.60-1.26	0.46	NA	NA	NA
Income > 5000 TL	53 (41.7)	1.66	1.13-2.43	0.008	1.33	0.87 – 2.02	0.177
Being a healthcare worker	13 (10.2)	2.31	1.20-4.44	0.009	1.17	0.51 – 2.66	0.708
High cultural status	54 (42.5)	1.63	1.11-2.38	0.011	1.36	0.90 – 2.05	0.143
University degree	94 (74)	2.16	1.42-3.30	<0.001	1.94	1.21– 3.09	0.005
Number of antibiotics in the last year 1-3 >3	51 (40) 3 (2.5)	2.53	1.83-3.49	<0.001 (reference to 0 antibiotic usage in last year)	0.45	0.32– 0.64	<0.001
Informed by health care provider	58 (45.6)	1.70	1.17-2.48	0.005	1.68	1.11– 2.45	0.013
Antibiotic use with prescription only	120 (94.5)	0.13	0.06-0.28	<0.001	0.15	0.06– 0.33	<0.001

* Logistic regression (characteristics found to be significant in the univariate analysis included only)

within the last year. About 24% of the participants demand antibiotics when they visit a physician. Of these, 83.5% have reported that the physicians complied with their demands. This underlines the pressure on physicians as a contributing factor for inappropriate antibiotic usage. In a similar study conducted in Ankara in 2014, Gül et al. reported that 64% of their participants demanded a prescription for antibiotics when they visited a physician (11). Recently, the Turkish Ministry of Health has launched a big campaign with the slogan "Don't insist on antibiotics, insist on your health." This slight decrease between 2017 and 2014 on demanding an antibiotic indicates an improvement and reveals the impact of this intervention. Educating people may improve JAU by alleviating this pressure.

JAU was found to be 12.2% while a similar study in Italy reported 21.2% (12). High income, education and cultural level were found to be related to JAU. These data are in parallel with studies from Malaysia

and Hong Kong (13,14), which point out the importance of education.

While 27.6% of our participants have a history of using antibiotics without prescription, İlhan et al. reported a ratio of 19.1% in their study conducted in 2009 in Ankara (15). The rate of self-medication with antibiotics was reported as high as 64.3% in another study conducted in 2014 in Ankara (11). This ratio was reported as 32.7% in Italy (12) and 7.6% in Malaysia (13). In 2016, the Turkish Ministry of Health banned the sale of antibiotics without a prescription. This precaution is expected to decrease antibiotic usage, and as such, the spread of resistance.

While our study did not find a correlation between gender and JAU ($p=0.469$), a study from Sweden reported that males used antibiotics more rationally compared to females (16), whereas the opposite was found in a study in Norway (17).

Six hundred eighty-four (67.5%) of our participants were aware of the term of antibiotic resistance. 117 (17.1%) of these could not link antibiotic use and the development of resistance. In Italy, 9.8% could correctly define antibiotic resistance (12). In the study from Norway, 71% of participants were highly aware of antibiotic resistance (17). In the Malaysian study, 59% of the participants knew the causes of antibiotic resistance (13). In a study from England, 97% of participants knew that antibiotics should not be used unnecessarily, and 79% had an awareness of the rising rates of resistance in hospitals (18).

In our study, the primary source from where the participants heard the term antibiotic resistance was the internet (n=348, 51.03%). In the study from Italy, the physicians (80.1%) were the most important source (12). Our study showed that the patients who were informed about the possible harms of antibiotic use (34.9%) had a high JAU. Thus, thorough information provided by the physicians may contribute to improving JAU.

Our study showed that 64.3% of the people keep unused antibiotics, and about 10% offer leftover anti-

biotics to others. In the study of Derin et al., it was determined that keeping antibiotics for future use was associated with inappropriate antibiotic use (9). In the same study, the rates of prematurely stopping antibiotics were found higher in those patients who used antibiotics for upper respiratory complaints. In our study, it was seen that 203 (19.4%) of participants stopped taking antibiotics when their complaints subsided, and not completed the prescribed regimen. In order to prevent this inappropriate practice which may lead to antibiotic resistance, the number of pills can be limited by the duration of treatment in addition to informing the patients about the adverse effects of using leftover drugs.

Conclusion: The level of JAU is low in Ankara. This result was the consequence of not only the inadequate information provided by the health care professionals but also the low level of education and cultural status of the public. Informing people about the interaction between inappropriate antibiotic use and antibiotic resistance is pivotal in raising awareness as well as the level of JAU. Due to the wide distribution and ease of access, this information may be provided by health care professionals on web-based platforms.

Ethics Committee Approval: The Ethical Committee of Ankara University, Turkey, approved the study with the decision number of 23.12.2016/7484.

Informed Consent: Written consent was obtained from the patients.

Peer-review: Externally peer-reviewed

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SUPPLEMENT: EVALUATION OF ANTIBIOTIC USAGE IN ANKARA

Dear participant, this survey is prepared for a scientific study to figure out Judicious Antibiotic Usage (JAU) and its determinants. You won't be asked any questions that reveal your identity. Your answers will be used for scientific purposes only and the data collected in this study will be published as an article in scientific journals.

1. Your age:
2. Your occupation:
3. Your educational level:
 - a. Illiterate b. Literate c. Primary school
 - d. High school e. University
4. Your sex:
 - a. Male b. Female
5. Your monthly income (Turkish Lira):
 - a. <1300 b. 1300-5000e
 - c. 3000-5000 d. >5000
6. Number of households:
7. Number of books you read each year:
8. Do you read daily newspaper?
 - a. Yes b. No
9. Is there any member in your family who takes medicines for a chronic illness?
 - a. Yes b. No
10. How many courses of antibiotic did you use in the last 12 months?
 - a. 0 b. 1-3 c. >3
11. Have you ever used antibiotics without a prescription?
 - a. Yes b. No
12. Have you ever participated in an educational programme about antibiotics? (i.e. taking a lecture, attending a conference etc.)
 - a. Yes b. No
13. Have you been informed by your physician about the side effects of antibiotics?
 - a. Yes b. No

14. What do you do with the leftover antibiotics? (please select all that apply)
 - a. I keep them for future use
 - b. I throw them away
 - c. I return them to pharmacy
 - d. I offer them to acquaintances

15. What do you do when you miss taking your antibiotic on time?
 - a. I take it with the next dose
 - b. I take it as soon as I remember

16. For how long do you take prescribed antibiotics?
 - a. I take them as prescribed by my physician
 - b. I stop taking when I feel good

17. Do you think that antibiotics may have some harmful effects?
 - a. Yes, they may
 - b. No, they are safe

18. What kind of harmful effects do you think that antibiotics have?
.....
.....

19. Who may get affected by the harmful effects of antibiotics?
 - a. Only the one who uses antibiotics
 - b. The one who uses and his/her households
 - c. Entire society

20. Do you use leftover antibiotics?
 - a. Yes
 - b. No

21. Do you use antibiotics without prescription?
 - a. Yes
 - b. No

22. Do you use antibiotics when you have fever?
 - a. Yes
 - b. No

23. Do you use antibiotics when you have sore-throat?
 - a. Yes
 - b. No

24. Do you use antibiotics when you have runny nose?
 - a. Yes
 - b. No

25. Do you use antibiotics for the same complaints you had before and had been treated with antibiotics by a physician?
 - a. Yes
 - b. No

26. Do you use antibiotics through advise of your acquaintances?
a. Yes b. No
27. Do you recommend antibiotics to your acquaintances?
a. Yes b. No
28. Have you ever asked your physician to prescribe an antibiotic?
a. Yes b. No
29. Did your physician prescribe an antibiotic on your demand?
a. Yes b. No
30. Have you ever heard about the term “antibiotic resistance” before?
a. Yes b. No
31. (If you heard) From which source have you heard about antibiotic resistance? (pleaseselect all that apply)
a. TV
b. Newspapers
c. Social media
d. Internet
e. Friends
f. Educational programme (at school, conference, course etc.)
32. Do you think that taking antibiotic can cause “antibiotic resistance”?
a. Yes b. No c. I have no idea
33. Do you think that antibiotics can become ineffective in treating infections if they are used often?
a. Yes b. No c. I have no idea

Thank you very much four your help.