

## **Self-Medication with Antibiotics by a Population in Northern Israel**

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In collaboration with the Self-Medication with Antibiotics and Resistance (SAR) project of Europe

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### **Abstract**

**Background:** The current study is part of a larger study – Self-Medication with Antibiotics and Resistance Levels in Europe (SAR project) – coordinated by the University of Groningen in the Netherlands and run in 19 European countries and Israel.

**Objectives:** To estimate self-medication with antibiotics by a population in northern Israel.

**Methods:** We sent by post a questionnaire on antibiotic usage to 2,615 adults, both Jewish and Arab, living in northern Israel.

**Results:** The overall response rate was low (17.9%), particularly among the Arab population (9.4% of respondents). Among the 467 respondents, 169 (36.2%) reported 215 antibiotic courses within the last year. Amoxicillin was the antibiotic most commonly used (32.7% of courses); 89.4% of antibiotics were obtained via a physician's prescription; 114 respondents (24.4%) stored leftover antibiotics at home, and 81 (18.7%) would consider self-medication with antibiotics without a medical consultation.

**Conclusions:** Over-the-counter acquisition of antibiotics is rare in Israel. However, the storage of leftover antibiotics in the home constitutes an alternative potential source of self-medication that can have untoward consequences, not only for the individual patient but also for the general population since inappropriate antibiotic usage contributes to the increasing rates of antimicrobial resistance.

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The continuing emergence and spread of antimicrobial resistance is a worldwide public health problem. The main reason is the excessive and unjustified use of antibiotics [1]. In the United States, 160 million antibiotic prescriptions are distributed annually and there is evidence that inappropriate use occurs in approximately half of these [2]. In particular, antimicrobials are often used for "respiratory tract infections" that are actually caused by viral agents and do not warrant the use of antibiotics. Interventional programs initiated to decrease inappropriate antibiotic prescribing by physicians have led in some cases to favorable results including less prescribing for viral illnesses [3] and the use of more narrow-spectrum instead of wider-spectrum agents [4].

Although most of the focus regarding inappropriate antibiotic use has been directed at physicians, some researchers have proposed that the role of patients also be assessed. Self-medication with antibiotics is possible via several avenues:

a) they are legally available over-the-counter, b) antibiotics initially prescribed by physicians are saved and subsequently used without a medical consultation, c) antibiotics are obtained through friends or relatives, and d) they can be acquired via the Internet. Antibiotics are available over the counter in many developing countries but are prescription-only in the U.S., Canada and all European countries. However, in some European countries (mostly southern Europe), antibiotics are available directly from the pharmacy. Self-medication with antibiotics can lead to an unfavorable medical outcome for the individual patient, such as adverse drug reactions, drug interactions that mask the correct diagnosis, and the development of a super-infection. Moreover, inappropriate antibiotic usage by the patient has wider implications for the population as a whole because it also contributes to the development of antimicrobial resistance.

Data on antibiotic use in Europe is available and shows wide variations from country to country. For example, non-hospital use of antibiotics defined as daily doses per 1,000 people per day ranges from 36.5 in France and 32.4 in Spain to 11.3 in Denmark and 8.9 in the Netherlands [5]. Similarly, data on resistance rates in Europe show that resistance rates are generally higher in Mediterranean countries and lower in more northern countries [6]. Resistance rates generally show a correlation with overall antibiotic consumption. However, until recently there was little information on the possible inter-relationship between antibiotic use, resistance rates, and self-medication with antibiotics. In order to assess the prevalence of overall consumption of antibiotics including self-medication and to plan for programs aimed at reducing resistance rates in 19 European countries, the University of Groningen, Netherlands, initiated a project entitled: Study on Self-Medication with Antibiotics and Resistance levels in Europe (SAR), funded by EU/SANCO of the European Public Health Alliance [7]. Under the auspices of this project, a self-administered questionnaire was developed in English, translated into the relevant national languages, and sent by post to various populations in selected European countries. The questionnaire includes items relating to demographics, overall use of antibiotics, and self-medication with antibiotics.

Israel is one of the countries included in the SAR program and the aim of this article is to report the results of the SAR questionnaire that was sent to a population in the north of the country. In Israel, antibiotics are available by prescription only.

## Patients and Methods

The self-administered SAR questionnaire, developed in English by the SAR project group coordinated by the University of Groningen in the Netherlands, was translated into Hebrew and Arabic and then back-translated to English to validate the translation. The questionnaire comprised items pertaining to age, gender, actual use of antibiotics in the past year (not including topical antibiotics), source of the prescription, reason for taking the antibiotic, type of antibiotic, storage of antibiotics in the home, and intent to use antibiotics without consulting a physician.

The study was conducted from October 2002 to December 2003. Using the registry of the Clalit Health Services, the questionnaires were randomly sent to 2,615 of its members, approximately half of whom were Jewish and half Arab. The study population consisted of adults over the age of 18, who, where relevant, were also asked to give information regarding their children under 16 years old. Two to four weeks after the first questionnaire was sent out, 500 reminders were mailed to non-responders, with a new survey form attached.

Respondents were contacted and, following receipt of a written informed consent, were visited by two medical students to check the storage of antibiotics in the home. Data were analyzed descriptively.

## Results

Of the 2,615 questionnaires sent out, only 467 (17.9%) were returned. Table 1 summarizes the demographic characteristics of the respondents and non-respondents. More than 90% of the respondents were Jewish and less than 10% were Arab. Nearly 60% of respondents were female.

Use of antibiotics within the past year was reported by 169 respondents (37.0%), who took 215 antibiotic courses; no difference in this figure was observed between the Jewish and Arab populations. A total of 163 of the respondents (34.9%) had children  $\leq 16$  years old and 78 (47.9%) responders had taken antibiotics during the previous year. Of the 215 antibiotic courses taken by reported antibiotic users, 89.4% were prescribed by a physician, 4.25% by a nurse, and only 5.1% were antibiotics that had not been prescribed by a physician or nurse [Table 2]. Table 3 shows the types of antibiotics used in the 215 antibiotic courses. Penicillins were the most frequent antibiotic used, followed by cephalosporins and macrolides. Upper respiratory tract infection and cystitis were the two most frequent indications for the use of antibiotics (28% each) followed by tonsillitis, pneumonia and otitis/sinusitis (9–11%) [Table 4].

Altogether, 114 respondents (24.4%) stored antibiotics at home; these include those who are actual users of the same antibiotic in the previous 12 months. Of these hoarders, 26.3% would take antibiotics without a medical consultation and 8% would give their children antibiotics without a medical consulta-

**Table 1.** Demographic characteristics of respondents

	No. of respondents (%) (n=467, 17.9%)	No. of non-respondents (%) (n=2148, 82.1%)
<b>Gender</b>		
Male	193 (41.3)	1042 (48.5)
Female	274 (58.7)	1106 (51.5)
<b>Age (yrs)</b>		
Mean	49.6 $\pm$ 16.9	42.8 $\pm$ 17.01
Range	18–94	18–93
<b>Residence</b>		
Urban	166 (35.5)	1041 (48.5)
Rural	301 (64.5)	1107 (51.5)
<b>Ethnic group</b>		
Jewish	423 (90.6)	257 (58.5)
Arab	44 (9.4)	891 (41.5)
<b>Have children <math>\leq 16</math> yr</b>		
Yes	163 (34.9%)	No data available
No	304 (65.1%)	No data available

**Table 2.** Sources of 215 antibiotic courses

	No. (%)
Physician	196 (91.2)
Nurse	10 (4.7)
Leftovers	6 (2.8)
Relatives	3 (1.4)

**Table 3.** Antibiotic classes used for the 215 antibiotic courses

	No. (%)
Amoxicillin	68 (31.6)
Penicillin	16 (7.4)
Amoxi/clavulanate	21 (9.8)
Cefuroxime	26 (12.1)
Macrolides	16 (7.4)
Quinolones	8 (3.7)
Nitrofurantoin	8 (3.7)
Tetracyclines	6 (2.8)
Others	39 (18.1)
Don't remember	7 (3.3)

**Table 4.** Clinical indications for the 215 antibiotic courses

	No. (%)
Upper respiratory tract infection	58 (27.0)
Pneumonia	21 (9.8)
Cystitis	58 (27.0)
Otitis/sinusitis	19 (8.8)
Tonsillitis	23 (10.7)
Soft-tissue infection	10 (4.7)
Gastroenteritis	10 (4.7)
Others	9 (7.4)

tion. Of all respondents, 81 (18.7%) would take antibiotics without a medical consultation. In other words, many of those with antibiotics stored at home also intend to use them without a prescription. However, only 20 (4.3%) would give antibiotics to their children without seeking medical advice.

## Discussion

In the present study 38% of the participants (and 48% of the responders with children) took antibiotics during the past year, and an average of 0.45 antibiotic courses/year was reported. In our survey, 88% of our respondents were prescribed antibiotics by the physician. Although clinical outcomes and appropriateness of prescribing were not evaluated in this study, it is likely that a significant portion of the Israeli prescribing was unnecessary as respondents reported upper respiratory tract infection to be the indication for the antibiotic prescription in 28% of cases. In addition, the broad-spectrum antibiotic amoxicillin comprised 33% of antibiotic courses in our survey as compared to 1.5% in the Swedish survey, while the narrow-spectrum antibiotic penicillin V was used in 8% of Israeli antibiotic courses compared to 38% of the Swedish courses.

Our study found that patients, too, contribute to inappropriate antibiotic use. Nearly 25% of respondents stored antibiotics at home and 17% said they would take antibiotics without a medical consultation. The corresponding figure from the Swedish study was far lower – only 4% of respondents had at least one antibiotic in the home, although 11% said they would consider self-medicating if necessary.

Our results are remarkably similar to two studies performed in the U.S. Ceaser and Wurtz [8] interviewed 101 adults on a city street [8], and 26% of interviewees said that they had kept the remaining portion of their antibiotic prescription and 14% said they would use the leftover antibiotic without consulting a healthcare provider. A second survey of 1,363 patients attending a suburban Emergency Department found that 43% of patients reported using antibiotics in the past year (vs. 38% in the present survey) and 17% had taken leftover antibiotics without consulting a physician [9]. These nearly identical figures from Israel and the U.S., while troubling, are not as bad as those from countries where antibiotics can be obtained without a prescription. In Spain for example, antibiotics are available without a prescription. The URANO project was organized to evaluate the usage of antibiotics in Spanish households. Of 1,000 households randomly contacted by telephone, 42% currently had antibiotics in the home, and in 19% of these homes there was a family member *currently* being treated with an antibiotic [10]. Self-medication occurred in 29% of cases. In Russia, antimicrobials are not included in the list of over-the-counter medicaments, but people can freely purchase antibiotics from most state-managed and commercial drug stores. A survey of nine large cities in Russia found that 84% of 900 families stored antibiotics in the home! [11]. Respondents had used the stored antibiotics without a physician's recommendation in 86% of 2,309 antibiotic courses. It should be noted that in Malta, as in Russia, antibiotics are legally prescription-only

medicines although pharmacies often dispense antibiotics based on symptoms. Yet a Maltese survey showed that only 19% of respondents said that they took antibiotics without a prescription [12]. Since this figure is substantially lower than that from the Russian survey, it appears that societal and cultural factors influence self-medication with antibiotics despite their legal status.

The main limitation of the present study was the low response rate in general, especially among the Arab population. Second, we did not determine whether the leftover antibiotics stored in respondents' homes were due to poor patient compliance, where patients did not complete the entire course of antibiotics as prescribed, or whether the leftover medicine was simply due to too large packaging of antibiotics that contained medicine in excess of what was needed. This detail might be relevant since incomplete courses of antibiotics could themselves possibly contribute to antibiotic resistance. Third, the recall among respondents may not have been accurate. In a survey of patients attending a clinic for sexually transmitted diseases, 29 of 48 patients denied self-medication with antibiotics but had a positive urine test for antibiotics, and other patients reported usage but had negative urine results [13]. High rate of leftover antibiotics is not enough proof to indicate contribution to antimicrobial resistance.

Despite potential limitations, our findings that a meaningful number of households with stored antibiotics and respondents would contemplate self-medication suggest that patient reminders on good antibiotic practice should be encouraged. Although consumer-oriented sections on proper antibiotic usage appear on several websites, such as that of the U.S. Centers for Disease Control, another alternative would be a printed page to be dispensed by the pharmacist with each antibiotic prescription. This page could explain why self-medication with antibiotics is detrimental to both the individual and the population as a whole, and could prompt the patient to return unused medication to the pharmacy.

Reduction of inappropriate antibiotic usage requires action at several levels. First, countries where antibiotics are available without a prescription should enforce regulatory measures restricting access to prescription-only. Second, interventions to curb physicians over-prescribing have the potential to significantly dampen the increasing antimicrobial resistance rates. Third, patient education to eliminate self-medication could add an important dimension to the effort to reduce inappropriate antibiotic usage.

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