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Major Article

Antibiotic knowledge and self-medication practices in a developing country: A cross-sectional study

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Background: Self-medication is identified by the World Health Organization as a major factor leading to antibiotics overuse, misuse and resistance. This study's objectives were to evaluate the knowledge and self-medication with antibiotics in a sample of the population of Lebanon.**Methods:** This study surveyed a sample of adults (over 18 years of age) residing in 2 major cities in Lebanon about their knowledge and self-medication with antibiotics. Health care professionals were excluded from the study.**Results:** Four hundred questionnaires were completed. Of the responders, 72% were between 18 and 45 years of age with an overall 86% having completed at least high school. For their knowledge about antibiotics, 61% thought that antibiotics should be taken for common cold and 83% knew that misuse of antibiotics could result in microbial resistance. Self-medication significantly correlated with a lower educational level ($P = .036$). Those with lower knowledge about antibiotics stopped antibiotics at the inappropriate time ($P = .002$). Socioeconomic status, gender and age did not correlate with self-medication.**Conclusion:** Self-medication was associated with a person's educational level and knowledge of antibiotics. Awareness campaigns and enforcing medication dispensing laws are needed in to avoid self-medication with antibiotics.

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According to the Centers for Disease Control (CDC), one-third to one-half of all antibiotics prescribed in the U.S. are either unnecessary or inappropriate based on microorganisms' culture and susceptibilities. Each year, 2 million people suffer from infections and are treated with antimicrobials. Among those, at least 23,000 die from complications that result from antibiotic resistance. The CDC supports antibiotic stewardship programs in order to ensure appropriate antibiotic use in an effort to minimize the emergence of bacterial resistance. However, these programs are yet to be expanded in hospitals and ambulatory care settings.¹ Also, the World

Health Organization (WHO) recommends the education of the public and health care providers on averting antibiotic misuse and the concerns of bacterial resistance.²

Globally, studies have assessed public knowledge on the use and prevalence of self-medication with antibiotics,³⁻⁹ as well as factors associated with antibiotic misuse,⁷ antibiotics prescription by non-infectious disease physicians,¹⁰ antibiotics dispensing by pharmacies,^{11,12} and population knowledge, attitude and practice of antibiotic use.¹³

In Lebanon, the Lebanese Ministry of Public Health laws regulate some prescription medications (psychiatric drugs, opioids derivatives), and the Pharmacy law prohibits dispensing prescription medications without a physician's order. However, the governing rules and regulations are mostly not enforced.¹⁴ Such a situation encourages self-medication, including the misuse of antibiotics.⁷ A report by the WHO noted high antibiotic resistance across the Eastern Mediterranean region, including Lebanon, with high levels of resistance of *Escherichia coli* to third-generation cephalosporins and fluoroquinolones, and of *Klebsiella pneumoniae* to third-generation

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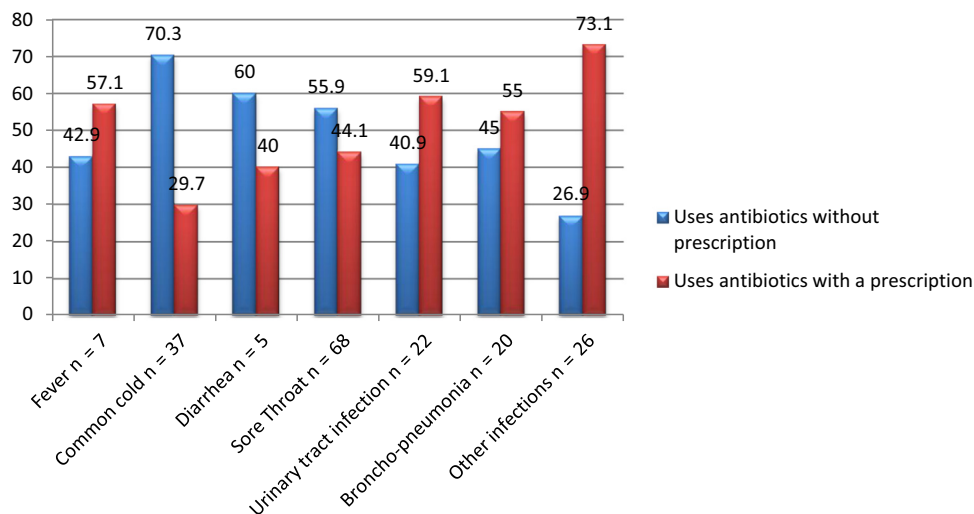


Fig 1. Antibiotics use with or without prescription for the presumed indication.

cephalosporins.² Particularly in Lebanon, *Escherichia coli* susceptibility to fluoroquinolones has decreased during the past decade from 75% to 53%, and the prevalence of extended spectrum β -lactamase (ESBL) producing *Klebsiella pneumoniae* has increased from 12% to 28%.^{15,16} Additionally, there is emergence of extensively drug resistant (XDR) *Acinetobacter*, *Pseudomonas*, and carbapenem-resistant *Enterobacteriaceae*.^{15,17}

Educating the general population about proper antibiotics use and discouraging self-medication are among the WHO's recommendations.² The primary objectives of this study were to evaluate the knowledge and self-medication practices of antibiotics in the country of Lebanon by randomly surveying a sample of the population with no medical background.

MATERIALS AND METHODS

This is a cross sectional study conducted in 2 major cities of Lebanon, Beirut and Tripoli, where a convenience sample of people on the streets was asked to complete a questionnaire. These 2 cities are considered major cities in Lebanon that people seek for life facilities including work, education and health care. Excluded from the study were health care workers; pharmacists, physicians and nurses in addition to those less than 18 years of age.

Between November 1, 2012 and January 31, 2013, people passing by were asked to fill out a specifically designed questionnaire that was adapted from a validated scale and written at a grade 5 school level. The questionnaire included demographics, educational background, socioeconomic status, antibiotic use in the last 3 months, stopping antibiotic therapy, and whether antibiotic use followed a prescription or self-medication.¹⁸ Monthly income was categorized as less or higher than 1,000 USD. According to the World Bank, 70% of the of the working Lebanese population makes on average less than the equivalent of 10,000 USD per year.¹⁷ The questionnaire was provided in English and Arabic depending on the participant's choice and was completed directly by the person. This study was approved by the university's Institutional Review Board.

Statistical analysis

Statistical analysis was done using IBM-SPSS version 22 software for Windows Release (IBM Corp. Released 2013; IBM SPSS Statistics for Windows, Version 22.0; Armonk, NY: IBM Corp.). De-

scriptive statistics included percentages for multinomial variables, means and standard deviations for continuous variables and bivariate and multivariate analyses were conducted. Chi-square test was used to assess associations between multinomial variables. A score of knowledge about antibiotics was created using 6 questions representing the knowledge about appropriate antibiotic use, then dichotomized into a dichotomous variable using the median as a threshold (knows/does not know). Stopping antibiotics at the right moment was used as a surrogate for the right use of antibiotics. Logistic regressions assessed the correlation between independent variables and the knowledge about antibiotics and their proper use using socio-demographic characteristics as independent variables, using the ENTER method to show all variables results. A *P* value less than .05 was considered significant.

RESULTS

Four hundred questionnaires were completed. Participants included 182 men and 218 women, with the majority (72%) less than 45 years of age. Of those, 86% had at least a high school degree and 187 participants (47%) had a monthly income less than \$1,000. For their antibiotic use, 185 (46%) participants took antibiotics during the last 3 months prior to filling in the questionnaire, 204 (51%) did not take any antibiotics, and 11 (2.8%) did not remember. Of those who took antibiotics, 95 (51%) had taken them without prescription and 90 (49%) following a prescription.

Also, 272 (68%) people thought that antibiotics should be taken for a sore throat, 120 (30%) thought that was not a proper indication, and 8 (2%) did not provide an answer. Additionally, 245 (61%) people thought that antibiotics should be taken for the common cold, 264 (66%) expected to obtain a medical prescription after a physician consultation for a bad cold (Fig 1) and 188 (47%) thought that their illness required antibiotics even before consulting with a physician. Moreover, 205 (51%) believed that antibiotics are effective against viruses, whereas 187 (47%) knew that antibiotics do not treat viral infections. Interestingly, 332 (83%) of participants agreed that antibiotics misuse could lead to resistance.

On the other hand, lower knowledge about antibiotics (taken as a dependent variable) was assessed in the light of socioeconomic characteristics such as gender, age, education and income. People with lower educational level (less than grade 9) used significantly more antibiotics without prescription than those with higher

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