Studying the knowledge, attitude and practice of antibiotic misuse among Alexandria population

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ABSTRACT

Aim To assess knowledge, attitude and practice (KAP) of antimicrobial self-medication among a convenience sample of population in Alexandria, Egypt.

Methodology A descriptive cross-sectional study using a self-administrated semi-constructed questionnaire. A convenience sample of 359 participants was studied using appropriate consent. The questionnaire had four sections: demographics, KAP, professional medical knowledge and attitude of children caregivers toward antimicrobial self-medication. The questionnaire was initially constructed in English and then translated into its final Arabic version. The Arabic version was pilot-tested and face-validated. Descriptive and quantitative analysis were performed using SPSS (V.20.0).

Results Approximately 64% (231) of the studied population used antibiotics without prescription in the past 12 months. This was significantly correlated with female gender and lack of knowledge. The main reason for self-medication was due to saving time and effort (109, 47%) followed by not preferring doctor visits (89, 39%). More than 60% of cases used amoxicillin-clavulanic acid. The main sources of antibiotics were leftovers from previously prescribed pharmaceuticals and those purchased from community pharmacies. 85 participants were young children caregivers of which 18 (21%) reported administering antibiotics to their children without consulting a physician. Out of 115 who claimed attaining medical background, only 30 (26%) managed to answer section 3 correctly with 23 of them reporting antibiotic self-medication.

Conclusion This study showed an increased tendency towards antibiotic self-medication among Alexandrian adults and children that was not significantly decreased in population with medical background. The reasons discussed within the study should be further addressed to decrease such practice.

INTRODUCTION

Antibiotics are medications that are used to kill or inhibit the activity of bacteria.¹ They can be used for treatment or prophylaxis purposes. Antibiotics misuse can be performed either through medication non-compliance or self-medication.² Antibiotic self-medication is their purchase and self-administering, or administering them to children, with the aim of treating a perceived infection without consulting a healthcare professional.³ Self-medication practice is a worldwide problem and is not restricted to low/middle-income countries.^{3, 4} Among the countries reporting antibiotic self-medication are southern

Spain which reported 41%,⁵ Jordan and Finland 40%,^{6, 7} Greece and Ghana >70%,^{6, 8} Cairo 29.8%⁹ and Romania 19.8%.¹⁰

Internationally, the antibiotic misuse was reported to be due to multiple factors, including lack of compliance, availability of antibiotics as over-the-counter medications with absence of rules and regulations that prohibit such practice.^{11, 12} Lack of healthcare professional knowledge and/or appropriate patient education usually plays a key role in such findings.³ The elevated medical services, consultation and laboratory testing, costs and dissatisfaction with medical practitioners have augmented such problem.¹⁰ Antibiotic misuse may have a massive effect on social, economic and health aspects due to the emergence of bacterial resistance which is the resistance of a micro-organism to an antimicrobial drug that was originally effective for treatment of infections caused by it.¹³ This phenomenon may lead to the ultimate result of failure of first-line antibacterial treatment forcing the patient to shift to less conventional medications, many of which are more expensive and/or associated with more serious side effects.

In 2011, WHO has set the theme of World Health Day as 'Combat Antimicrobial Resistance: No Action Today, No Cure Tomorrow'.¹³ In 2014, WHO has reported increasing levels of antibiotic resistance that is threatening the control of bacterial diseases and resulting in social and economic burdens. It has also reported a major knowledge gap about the magnitude of antibiotic resistance in the Middle East and worldwide.¹⁴ Therefore, the purpose of the present study is to estimate the extent of antibiotic misuse and factors associated with antibiotic self-medication among citizens of Alexandria governorate.

METHODOLOGY

Study design and sampling

Our study is a descriptive cross-sectional study that assesses the attitude of population usage of antimicrobial agents in the governorate of Alexandria, Egypt. A convenience sample of 400 was taken to cover different districts of the Alexandria governorate as well as different backgrounds and age groups. The studied subjects were subjected to self-administrated semi-constructed questionnaire (see online supplementary data).

Data collection

The convenience sample was interviewed in pharmacies, clubs, cafes, streets and at Alexandria

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University over 2 months between August and October 2014 by the innovation project students. Consent was taken before answering questionnaire and confidentiality of data was ensured.

Questionnaire construction and validation

The questionnaire was structured to contain some newly developed questions by the research team as well as some questions adapted from previously similar validated published questionnaires.^{3 9 13} The questions were all measured and designed to fit and match the Alexandrian society traditions in English language and were then translated into its final Arabic Language version. The semi-final translated questionnaire version was pilot-tested for face validation and reliability before the final included version was reached.

The questionnaire consisted of 39 questions divided into four sections:

- ▶ First section: consists of nine questions relating to demographics including age, gender, job, nationality, address, monthly income, education level, suffering of chronic disease and presence of medical insurance.
- ▶ Second section: consists of 20 questions measuring general medical knowledge among people, self-medication practice, antibiotic misuse practice among the population, reasons for this attitude and nominate the most commonly misused antibiotics.

- ▶ Third section: consists of five questions to distinguish the population of medical background (students and professionals).
- ▶ Fourth section: consists of five questions to examine the attitude of children caregivers towards antibiotic misuse.

Data analysis and statistics

Data were coded, descriptive and quantitative analyses were performed using SPSS (V20.0). χ^2 test was used to examine the presence of statistical significant association between studied variable at $p < 0.05$. All data were expressed as mean $\pm$ SD, unless otherwise specified.

RESULTS

Out of 400 distributed questionnaires, 359 participants (89.7%) responded. None of the 359 questionnaires were excluded from the study. Except for one, all participants were Egyptians and 96% ($n=345$) were residents of Alexandria. Table 1 shows the socioeconomic demographics of the participant population in correlation with their self-medication attitude and practice. The diversity within the convenience sample used, as shown in table 1, has covered different categories within Alexandrian population. The medical background, chronic use of medications, economic standard and other educational or social parameters were not significantly correlated to the self-medication

Table 1 Relationship between the demographic factors and the rate of self-medication

Demographics	Total (n)	Self-medicating (n)	% Self-medicating (% of n total=359)	χ^2	p Value
Gender					
Male	137	70	19	12.1	0.000*
Female	222	155	43		
Education					
Non-educated	6	3	1	1.59	0.810
Basic	3	2	1		
Middle	57	41	11		
Over middle	12	6	2		
University	245	153	43		
Post-graduate study	36	25	7		
Profession					
Unemployed	33	18	5	6.57	0.255
Skilled worker	93	64	18		
Manual worker	5	3	1		
Housewife	22	17	5		
Student	171	111	31		
Other	35	17	5		
Monthly income					
None	199	129	36	1.59	0.810
500–1000 Egyptian Pounds	14	8	2		
1000–3000 Egyptian Pounds	31	21	6		
≥3000 Egyptian Pounds	31	22	6		
No answer	80	43	12		
Chronic diseases					
Having chronic diseases	58	10	17	5.38	0.068
Liver and/or kidney	10				
Diabetes	5				
Cardiovascular diseases	20				
Asthma	8				
Others	20				

*The χ^2 is statistically significant at $p < 0.05$ level.

attitude. However, women showed statistically significant higher self-medication practice than men ($p<0.05$).

The use of antibiotics without prescription in the past 12 months was reported by 231 participants (64.3%). They gave three major reasons for such attitude: saving time and effort (109, 47%); not preferring doctors' visit (89, 39%) and saving money (24, 11%), while (9, 4%) reported other reasons. The participants reported starting the antibiotic course when they mostly have the following symptoms: either sore throat associated with fever ($n=113$) or runny nose and cough (104) and nasal congestion (44). Amoxicillin-clavulanic acid was the most misused antimicrobial agent; it was reported by 41 of the 68 participants (more than 60%) who specified the exact type of antimicrobial misused. The participants' selection of the antibiotic was based on pharmacist's opinion (29%, $n=107$), their own previous experience (27%, $n=101$), family or friend suggestion (22%, $n=84$), previous doctor prescriptions (21%, $n=81$) or websites recommendations (1%, $n=2$). The factors that were most frequently considered when selecting antibiotic were its indication (41%, $n=148$), type (23%, $n=82$) and experiencing no previous adverse reactions (18%, $n=66$). Among the least considered factors were antibiotic price (6%, $n=23$) or brand (7%, $n=25$). Commercial pharmacies ($n=204$) and leftovers ($n=44$) were found to be the most common sources for obtaining antibiotics for self-medication. Regarding dose calculation, the participants reported more than one source, mostly consulting a pharmacist ($n=160$) or a physician ($n=146$), using pamphlets ($n=122$) and to a lesser extent they

used their previous experience ($n=67$) or consulted their friends and families ($n=37$). In addition, very small number reported using their own wit ($n=9$), internet resources ($n=6$) and scientific magazines ($n=1$).

Checking the participants' compliance to therapy, 36% of participants ($n=129$) completed the antibiotic course, while 38% ($n=132$) stopped it on disappearance of symptoms. Figure 1 describes the participants' attitude when they experience side effects. A total of 303 participants declared the habit of reading the pamphlet before using their antibiotics, with 122 claiming that they understand >75% of the information provided and another 122 claiming to understand 50%–75% of it. About 27% the of participants ($n=98$) kept the medication left-overs for a long period of time—an attitude that carries a positive statistically significant association with antibiotic self-medication ($\chi^2=10.922$, $p=0.001$).

On testing the common medical knowledge relating to antibiotic use in the society, 69% of the participants agreed that antibiotics are used to cure bacterial infections and 42% agreed that they can also cure viral infections. Such knowledge gap had a positive statistical significant association with the antibiotic self-medication practice ($\chi^2=7.970$, $p=0.019$). In addition, 28% of the respondents ($n=99$) believed that antibiotics can speed the recovery of common cold and 47% ($n=170$) believed that antibiotics are more effective if they are newer or their prices are higher. It was also noted that 43% of the population ($n=155$) never heard about bacterial resistance. Table 2 shows the common knowledge gap areas among our participants.

Figure 1 Bar graph showing the behaviour of participants when they experience side effects from their self-medicating antibiotic. A participant could have more than one answer.

Table 2 Knowledge questions performed by the medical and non-medical population in Alexandria

Population knowledge questions	(A) Does AB cure bacterial infection?	(B) Does AB cure viral infection	(C) Does AB speed recovery?	(D) Would newer AB or those of high prices be more effective?	(E) Have you heard about bacterial resistance?
Answer with Yes N (%)	249 (69.4%)	149 (41.5%)	99 (27.6%)	170 (47.4%)	200 (55.7%)

N: number of participants out of the 359.
AB, antibiotic.

Box 1 Section 3 questions of the questionnaire used in determining the population of medical background out of the participants

Section 2: If you are a graduate/undergraduate of medical, dentistry, pharmacy, veterinary, nursing, physiotherapy, please answer the following questions:

- Which of the following drugs are antibiotics?(check more than one if applicable)
 - Penicillin and its derivatives
 - Non-steroidal anti-inflammatory drugs
 - Tetracycline and its derivatives
 - Azithromycin and its derivatives
 - Salicylic acid
 - I do not know
- What is MRSA?
 - Methicillin-resistant *Staphylococcus aureus*
 - Myocardial reversal stenotic atrium
 - Describes a hepatic microsomal E deficiency
 - Medullary rays stones
 - I do not know
- Do you think antibiotics administration could be necessary in some cases? If yes, choose which of the following:
 - Transplant patient
 - Immunocompromised patients
 - Hepatic disorder patients
 - For post-surgical prophylaxis
 - I do not know
- Aspocid infantile can be used in children aged 14 to 16 years?
 - Yes, for relieving mild fever and cold cases
 - No, because it may cause Reye's syndrome in children aged under 18 years
 - Yes, because it increases the immunity in children aged under 18 years
 - No, because it may cause haemorrhage
 - I do not know
- What is 'drug susceptibility testing of bacteria' used for?
 - Checking toxicity of the drug
 - To test if antibiotic is efficient for treatment of this specific species of bacterial infection
 - To show if the drug affects the body cells
 - I do not know

A total of 115 participants claimed that they had medical background, 26% of whom (n=30) only managed to answer section 3 correctly (box 1). A participant was considered to answer section 3 correctly if they managed to answer three or more out of the five questions specified in box 1. It was quite interesting to realise however that 79% (n=23) of those who answered section 3 correctly (proper medical background) still performed antibiotic self-medication practice. About 79% of the participants (23 out of 30) with medical background reported self-medication attitude compared with 63% (208 out of 329) of those with non-medical background.

A total of 85 participants mentioned that they are caregivers for young children, 21% (n=18) of whom reported that they would give antibiotics without consulting a doctor, while 20% (n=17) reported that they usually call the physician and try to get a prescription over the phone. The children caregivers' attitude in self-medicating their children was significantly associated

Figure 2 Bar graph showing a comparison between the children caregivers' self-medication practice for themselves and their children in Alexandria.

with their own practice of antibiotic self-medication ($\chi^2=4.720$, $p=0.030$). Figure 2 shows a comparison between the children caregivers' self-medication practice for themselves and their children. Regarding choice of the antibiotic, 14% (n=12) mentioned that they would administer the same antibiotic they use for themselves to their children. Figure 3 describes the antibiotic therapy compliance among the children population as described by their caregivers.

DISCUSSION

Several studies have reported the antibiotic misuse worldwide. However, this is the first published study to measure knowledge, attitude and practice of antibiotic misuse in Alexandria, Egypt. The questionnaire used was either adapted from previously validated questionnaires (sections 2 and 4) or constructed by the research team (sections 1 and 3). Adaptations were performed for the questionnaire to be applicable to our society habits and cultures. It is worth mentioning that section 3 (box 1) was newly constructed by the research team to identify the population with medical background knowledge from the general population. A participant would be considered to have medical background if he or she correctly answers three or more questions out of five.

Despite the time and effort limitations of collecting the data using a questionnaire self-administered by participants in presence of the research team, the researchers ensured that questions were fully understood by the participants and guaranteed efficiency and accuracy of data collected. Our convenient sample (n=400) represented a good number to reflect the city's population (n=4 millions); in addition, the demographics (box 1) showed variability in the socioeconomic standards, age and gender among our participants verifying the validity of the sample.

Our paper showed that 64% of our sample performed antibiotic self-medication during 12 months prior to the study, compared with other areas like Spain which reported 41%,⁵ Jordan and Finland 40%,^{6, 7} Greece and Ghana >70%,^{6, 8} Cairo 29.8%⁹ and Romania 19.8%¹⁰ mostly within 3 months prior to the provided survey. These results are quite comparable where those countries have similar culture and medication regulations as Alexandria.^{1, 15, 16} The major reason behind self-medication attitude was prevalence of some knowledge gaps and misconceptions about antibiotic use and resistance. Where 42% agreed that antibiotics can cure viral infections, 28% confirmed that

Figure 3 Pie diagram showing antibiotic therapy compliance among the children population as described by their caregivers in Alexandria.

antibiotics can cause speedy recovery of common cold and only 56% heard about antibiotic resistance.

In addition to the misconceptions, the accessibility of antibiotics to the general population in community pharmacies and the economic status and beliefs as reported by the patients above are among the other reasons. The participants reported that most of the sources for self-medication were either their community pharmacy ($n=204$) or medication leftovers ($n=44$). This raises questions about regulatory agency's role in decreasing the antibiotic misuse among our population and increases the importance of initiating an appropriate national disposal system for the medications within the country. Despite the prevalence of self-medication attitude among the population, when it came to dose administered, patients were more cautious, where most of them would consult a healthcare professional or read the pamphlet before taking their medications. Studying other attitudes relating to antibiotic misuse and resistance, at least 26% of our sample reported non-compliance to complete therapy duration. This increases the emphasis on the pharmacist's role in patient education relating to bacterial resistance and best practices with antibiotic therapy and some drug interactions with other medications such as oral contraceptives and age restrictions. It is worth mentioning that amoxicillin-clavulanic acid represented more than 60% of the commonly misused antibiotics among our sample (41 out of 68 participants specified the exact type of antimicrobial misused).

Looking at section 3, 115 participants claimed to have a medical background, but only 26% ($n=30$) were able to answer specific medical questions correctly. This may be attributed to the fact that the participants were still medical students or healthcare providers with outdated medical knowledge. It was interesting to find out that even those who exhibited medical background, those who successfully answered section 3, have shown a similar self-medication attitude as the non-medical population. This may highlight a conclusion that society has the upper hand on their attitude rather than their medical knowledge. Finally, within our sample, 24% ($n=85$) were children caregivers, of whom 26% reported antibiotic self-medication for their children. This highlights that despite performing similar attitudes and practices, caregivers were more cautious when it came to their children.

In conclusion, antibiotic misuse in Alexandria is comparable with other countries with similar cultures within the region. It can be attributed to the following reasons: antibiotics are 'over the counter' medication with no regulations to control their issue; population, of medical and non-medical backgrounds, lack proper information or have some misconceptions on antibiotic use and the absence of proper waste programme for extra

medications from either patients or community pharmacies. Therefore, our study suggests carrying awareness campaigns to increase the knowledge about antibiotic resistance and proper use and enacting strict laws to restrict antibiotic prescription to physicians and/or pharmacists. Thus, antibiotic dispensing should be only under the above-mentioned authorisation and should be accompanied by proper patient education and leaflets. In addition, it is advisable to dispense the exact drug quantities prescribed to the patient to decrease drug waste and to initiate a proper national drug disposal system.

What this paper adds?

What is already known on this subject?

- ▶ Antibiotic resistance is a worldwide concern occurring mostly due to self-medication, non-compliance and other factors.
- ▶ Self-medication practice is not restricted to low/middle-income countries, where southern Spain reported 41%, Jordan and Finland 40%, Greece and Ghana >70%, Cairo 29.8% and Romania 19.8%.
- ▶ In 2014, WHO has reported a major knowledge gap about the magnitude of antibiotic resistance in the Middle East and worldwide.

What this study adds?

- ▶ About 64% of the sample representing Alexandrian population reported antibiotic self-medication during 12 months prior to the study.
- ▶ Having medical background did not decrease such attitude and practice.
- ▶ Children caregivers are more cautious with antibiotic self-medication practice where only 21% reported such attitude.

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