

An audit on the knowledge, beliefs and attitudes about the uses and side-effects of antibiotics among outpatients attending 2 teaching hospitals in Jordan

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دراسة تدقيقية في المعارف والمعتقدات والمواقف المتعلقة باستخدامات المضادات الحيوية وتأثيراتها الجانبية لدى المرضى الخارجيين في مستشفيات تعليميين في الأردن

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الخلاصة: هدفت هذه الدراسة إلى تقييم المعارف والمعتقدات العامة لدى الناس حول استخدام المضادات الحيوية. وقد استكمل الأفراد الذين يراجعون صيدليات العيادات الخارجية في مستشفيات تعليميين كبيرين في شمال الأردن استبيانات ذاتية الإجراء وذات مصداقية، وشارك في الدراسة 1091 فرداً (منهم 56.8% من الذكور)، وقد ذكر 20.1% من المشاركين أن المضادات الحيوية كانت تستخدم لمعالجة حالات العدوى الجرثومية، في حين كان 18.3% منهم يعتقدون أنها كانت تستخدم لمعالجة حالات العدوى الفيروسية، وكان 43.6% منهم يعتقد أنها تستخدم لمعالجة كلا حالات العدوى الجرثومية والفيروسية. وقد كان معدل أحرار معارف المشاركين حول استخدامات المضادات الحيوية وتأثيراتها الجانبية منخفضاً. وقد كان لدى المشاركين المتوسطي العمر وأولئك الذي تلقوا تعليماً بعد المدارس الثانوية درجات أعلى بقدر يُعتدُّ به إحصائياً حول استخدام المضادات الحيوية، ولم يوافق ما يقرب من 75% من المشاركين على أن المضادات الحيوية يمكنها أن تصرف بدون وصفة.

ABSTRACT This study aimed to assess general knowledge, beliefs and attitudes of people towards the use of antibiotics. Individuals referring to the outpatient pharmacies of 2 major teaching hospitals in the north of Jordan completed a self-administered, validated questionnaire. A total of 1091 individuals (56.8% males) participated in the study. Of these, 20.1% of the participants stated that antibiotics were used for bacterial infections, while 18.3% thought they were used for viral infections and 43.6% for mixed bacterial/viral infections. The average knowledge score of the participants about antibiotic uses and side-effects was low. Middle-aged participants and those with an education beyond high school had significantly higher knowledge scores about antibiotics use. Almost 75% of the participants disagreed that antibiotics could be given without a prescription.

Évaluation des connaissances, croyances et attitudes concernant l'utilisation et les effets secondaires des antibiotiques chez des patients en consultation externe dans deux hôpitaux universitaires en Jordanie

RÉSUMÉ La présente étude visait à évaluer les connaissances, les croyances et les attitudes générales concernant l'utilisation des antibiotiques. Les patients qui se sont adressés aux pharmacies des services des consultations externes de deux grands hôpitaux universitaires dans le nord de la Jordanie ont rempli un auto-questionnaire validé. Au total, 1091 patients (dont 56,8 % de sexe masculin) ont participé à l'étude. Parmi ceux-ci, 20,1 % des participants ont indiqué que les antibiotiques étaient prescrits pour lutter contre des infections bactériennes, tandis que 18,3 % pensaient qu'ils étaient destinés à combattre des infections virales et 43,6 % qu'ils étaient utilisés contre des infections mixtes virales et bactériennes. Le score moyen des connaissances des participants sur l'utilisation des antibiotiques et leurs effets secondaires était faible. Les participants d'un âge intermédiaire ainsi que ceux ayant suivi des études supérieures ont obtenu des scores nettement plus élevés concernant l'utilisation des antibiotiques. Près de 75 % des participants n'étaient pas d'accord avec l'affirmation selon laquelle des antibiotiques pouvaient être dispensés sans ordonnance.

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Introduction

Antibiotic resistance is now recognized as a global public health problem with major economic, social and political implications according to the World Health Organization (WHO) [1]. There have been prior reports that more than 70% of the bacteria associated with hospital-acquired infections in the United States of America (USA) are resistant to 1 or more of the drugs previously used to treat them [2]. Furthermore, the WHO states that 45% of deaths in low-income countries are due to infectious causes such as pneumonia, diarrhoea, and tuberculosis [1]. It has been reported that nearly 2 million patients in the USA get an infection in hospital each year, and about 90 000 die each year as a result of their infection [2].

Many factors are implicated in the emergence of bacterial resistance to antibiotics. One of these is the over-use and misuse of antibiotics, which merit special attention as there are many types. These include self-medication with antibiotics, which is an important problem in many countries, for example Turkey, Poland, Sudan and Jordan [3–7]. Although self-medication is perceived as a hazard to health, people with no health insurance may try to avoid paying for the services of the general practitioner and for laboratory tests by going directly to a pharmacy. This practice is very common in Jordan [3] despite the fact that the Jordanian Drug and Pharmacy Law classes dispensing antibiotics of any formulation without a prescription as a criminal offence, and violators are subject to a financial penalty. It is thought that competition among pharmacies could be the reason for such practices, despite any existing legislation [8,9]. However, accessibility to antibiotics as prescription-only-medications does not exclude the possibility of using them as self-medication. For example, antibiotics can be obtained as leftovers from incomplete courses

of treatment or may be supplied by friends or relatives. Some patients insist on the physician prescribing antibiotics. For example, in response to pressure from parents believing in the need for antibiotic treatment, paediatricians sometimes agree to prescribe antibiotics for their children [10].

According to the WHO, lack of education about the prudent use of antibiotics was one of the factors that affected the use of antibiotics [1]; many studies have, in fact, confirmed the positive effects of educational campaigns on the use of antibiotics [11–13].

The different ways of accessing antibiotics is an important factor with regard to education. In our country, where antibiotics are mostly accessed without prescription despite the presence of a law that bans such practices, it would be important to carry out public educational campaigns. In order to prepare an effective public education programme, knowledge about the most important points to tackle is imperative.

Thus, in this study, we evaluated the knowledge, beliefs and attitudes of the public toward antibiotic use.

Methods

Patients referred to the outpatient pharmacy of 2 major teaching hospitals (King Abdullah University Hospital and Princess Basma Teaching Hospital) covering the population in the northern province of Jordan were assessed. These hospitals receive patients representing all levels of society. This study took place between March 2008 and May 2008 and patients were recruited on a daily basis. Patients were given a description of the study and its goals, and were asked to participate. Excluded from the study were those who had a medical education-related degree such as physicians, pharmacists, dentists, nurses, and all supporting medical degrees and patients under 18 years old.

Those who agreed to participate were asked to complete and sign an informed consent form, and to complete a self-administered questionnaire while waiting to fill their prescriptions. Investigators were available to answer participants' questions during they were completing the questionnaire. The study was approved by the institutional review board of Jordan University of Science and Technology.

The questionnaire used in the study was prepared by the research team, and was validated by first having it reviewed by several colleagues in the field, then by conducting a pilot test on 20 people recruited from the outpatient pharmacy referral pool of both hospitals; they were not part of the study sample. The results were analysed to assess the clarity and the comprehensibility of the items on the questionnaire. In addition, the participants of the pilot study were asked to give any feedback they had about the questionnaire items. Their feedback was considered in preparing the final version of the questionnaire.

The questionnaire had 3 parts: the first part covered the demographic data of the participants. The second contained items asking about the nature of antibiotics use, and attitudes of participants toward the use of antibiotics in a number of minor ailments such as common cold and flu, cough, diarrhoea, etc., for which antibiotics are often misused. Additionally, participants were asked if antibiotics should be used for protection from infections, if they can be used without prescription, and if they should be continued after symptoms of the infection have resolved. In the third part of the questionnaire, participants were asked about common side-effects of antibiotics, and whether antibiotics could lead to health risks when used with other medications.

To generate the participants' knowledge data, items assessing knowledge and beliefs about antibiotics were recoded according to the response: each correct response was assigned 1 point

while wrong responses were assigned 0 points. Then, the sum of the responses for each participant was calculated, and placed on a scale of 1–100.

Sample size was based on previous studies on the same population [14,15]. Demographic data and categorical variables were summarized using frequency tables. Statistical analysis was performed using SPSS, version 15. $P < 0.05$ was considered significant.

Results

During the study period, 1138 patients were invited to participate in the study and 1091 (95.9%) agreed. Table 1 shows the demographic characteristics of the participants. They were similarly distributed according to age; 56.8% were males, and 52.2% were educated to at least university or community college level. More than half (57.2%) had an income < 250 Jordanian dinars. About one-third (35.6%) were living in villages.

The study sample had generally poor knowledge about the type or nature of infections or medical conditions for which antibiotics are used. Only 20.1% of participants believed that antibiotics are used for bacterial infections, while 18.3% thought that antibiotics were used for viral infections and 43.6% thought they were used for mixed bacterial/viral infections (Table 2). Almost 80% of participants thought that antibiotics could be used for common cold and flu sometimes/most of the time/always. When asked if antibiotics can be used for protection from infections, only 39.3% disagreed. Just under 75% disagreed with giving antibiotics without prescription, and over 70% agreed/strongly agreed that antibiotic use must be continued even after symptoms resolve.

In assessing knowledge of patients about the most common side-effects of antibiotics, many of the participants did not think that antibiotics caused

Table 1 Demographic characteristics of the participants (n = 1091)

| Demographic characteristic | No. | % |
|----------------------------|-----|------|
| Age (years) | | |
| 18–30 | 481 | 44.1 |
| 31–40 | 241 | 22.1 |
| 41–50 | 134 | 12.3 |
| 51–70 | 235 | 21.5 |
| Sex | | |
| Male | 620 | 56.8 |
| Female | 471 | 43.2 |
| Education level | | |
| ≤ High school | 522 | 47.8 |
| > High school | 569 | 52.2 |
| Profession | | |
| None | 276 | 25.3 |
| Housewife | 197 | 18.1 |
| Teacher | 145 | 13.3 |
| Craftsman | 77 | 7.1 |
| Engineer | 55 | 5.0 |
| Merchant | 86 | 7.9 |
| Other | 255 | 23.4 |
| Monthly income (JD) | | |
| ≤ 250 | 624 | 57.2 |
| > 250 | 467 | 42.8 |
| Residence | | |
| Rural | 388 | 35.6 |
| Urban | 703 | 64.4 |

JD = Jordanian dinar (JD 1 ≈ US\$ 1.4).

side-effects or did not know that they caused side-effects (Table 3): the proportion disagreeing or who did not know ranged from 32.1% for "antibiotics can cause skin rash" to 70.1% for "antibiotics can impair bone growth". On the other hand, 62.9% of the participants knew about the health risks of concomitant use of antibiotics with other medications (Table 3).

The mean knowledge score of the participants on a 1–100 scale was 39.6 (standard deviation 17.8), which is quite low. When assessed according to the demographic factors, knowledge scores were significantly affected by age and level of education ($P < 0.05$ for both) (Table 4). Other demographic factors, including sex, profession, monthly income and place of residence, had no statistically significant effect.

Discussion

The current study is the first to assess the knowledge, attitudes and beliefs of the Jordanian population about antibiotic use. Results of previous studies have shown there is a high percentage of self-medication with antibiotics [3,4,16]. In a recent study, antibiotics were listed by pharmacists among the top drugs that they suspected of being misused/abused by the public in Jordan [17].

The average knowledge score of the sample was low. This finding is further supported by the high proportion of participants thinking antibiotics are useful for the common cold, sore throat and the other minor ailments, thus showing the general lack of knowledge about this domain. These results agree with the findings of recent large cross-sectional

Table 2 Knowledge of participants of the use of antibiotics (n = 1091)

| Knowledge point | No. | % |
|---|-----|------|
| Antibiotics are used for: | | |
| Bacterial infections | 219 | 20.1 |
| Viral infections | 200 | 18.3 |
| Mixed infections | 476 | 43.6 |
| Do not know | 196 | 18.0 |
| Antibiotics can be used when you have symptoms of common cold or flu | | |
| Always | 106 | 9.7 |
| Most of the time | 338 | 31.0 |
| Sometimes | 407 | 37.3 |
| Rarely | 93 | 8.5 |
| Never | 115 | 10.5 |
| Do not know | 32 | 2.9 |
| Antibiotics can be used for sore throat | | |
| Always | 146 | 13.4 |
| Most of the times | 405 | 37.1 |
| Sometimes | 368 | 33.7 |
| Rarely | 62 | 5.7 |
| Never | 67 | 6.1 |
| Do not know | 43 | 3.9 |
| Antibiotics can be used when you have cough | | |
| Always | 120 | 11.0 |
| Most of the times | 299 | 27.4 |
| Sometimes | 342 | 31.3 |
| Rarely | 110 | 10.1 |
| Never | 173 | 15.9 |
| Do not know | 47 | 4.3 |
| Antibiotics can be used when you have fever | | |
| Always | 138 | 12.6 |
| Most of the times | 273 | 25.0 |
| Sometimes | 309 | 28.3 |
| Rarely | 114 | 10.4 |
| Never | 204 | 18.7 |
| Do not know | 53 | 4.9 |
| Antibiotics can be used when you have diarrhoea | | |
| Always | 92 | 8.4 |
| Most of the times | 199 | 18.2 |
| Sometimes | 320 | 29.3 |
| Rarely | 159 | 14.6 |
| Never | 271 | 24.8 |
| Do not know | 50 | 4.6 |
| Antibiotics can be used to protect against infections | | |
| Strongly agree | 101 | 9.3 |
| Agree | 377 | 34.6 |
| Do not agree | 429 | 39.3 |
| Do not know | 184 | 16.9 |
| Antibiotics can be given without prescription | | |
| Strongly agree | 37 | 3.4 |
| Agree | 195 | 17.9 |
| Do not agree | 800 | 74.2 |
| Do not know | 50 | 4.6 |
| Antibiotics should be continued if symptoms resolved | | |
| Strongly agree | 384 | 35.2 |
| Agree | 398 | 36.5 |
| Do not agree | 191 | 17.5 |
| Do not know | 118 | 10.8 |

Table 3 Knowledge of participants of the side-effects of antibiotics (n = 1091)

| Knowledge point | No. | % |
|---|-----|------|
| <i>Antibiotics can lead to shock</i> | | |
| Strongly agree | 141 | 12.9 |
| Agree | 281 | 25.8 |
| Do not agree | 191 | 17.5 |
| Do not know | 478 | 43.8 |
| <i>Antibiotics can cause skin rash</i> | | |
| Strongly agree | 204 | 18.7 |
| Agree | 537 | 49.2 |
| Do not agree | 69 | 6.3 |
| Do not know | 281 | 25.8 |
| <i>Antibiotics can cause gastrointestinal upset</i> | | |
| Strongly agree | 175 | 16.0 |
| Agree | 492 | 45.1 |
| Do not agree | 96 | 8.8 |
| Do not know | 328 | 30.1 |
| <i>Antibiotics can cause oral fungal infections</i> | | |
| Strongly agree | 69 | 6.3 |
| Agree | 351 | 32.2 |
| Do not agree | 211 | 19.3 |
| Do not know | 460 | 42.2 |
| <i>Antibiotics can cause gastrointestinal infections</i> | | |
| Strongly agree | 77 | 7.1 |
| Agree | 413 | 37.9 |
| Do not agree | 194 | 17.8 |
| Do not know | 407 | 37.3 |
| <i>Antibiotics can cause renal damage</i> | | |
| Strongly agree | 148 | 13.6 |
| Agree | 462 | 42.3 |
| Do not agree | 114 | 10.4 |
| Do not know | 367 | 33.6 |
| <i>Antibiotics can discolour the teeth</i> | | |
| Strongly agree | 107 | 9.8 |
| Agree | 310 | 28.4 |
| Do not agree | 217 | 19.9 |
| Do not know | 457 | 41.9 |
| <i>Antibiotics can impair bone growth</i> | | |
| Strongly agree | 75 | 6.9 |
| Agree | 252 | 23.1 |
| Do not agree | 195 | 17.9 |
| Do not know | 569 | 52.2 |
| <i>Antibiotics can lead to health risks when used with other medications</i> | | |
| Strongly agree | 178 | 16.3 |
| Agree | 508 | 46.6 |
| Do not agree | 120 | 11.0 |
| Do not know | 285 | 26.1 |

Table 4 Multivariate analysis of knowledge scores (1–100) of participants (n = 1091)

| Factor | Mean (SD) knowledge score | P-value |
|----------------------------|---------------------------|---------|
| Age (years) | | |
| 18–30 | 38.9 (18.1) | 0.003 |
| 31–40 | 36.8 (16.6) | |
| 41–50 | 42.3 (17.5) | |
| 51–70 | 42.0 (18.2) | |
| Sex | | |
| Male | 39.5 (17.9) | 0.837 |
| Female | 39.7 (17.6) | |
| Education level | | |
| ≤ High school | 36.45 (16.5) | < 0.001 |
| > High school | 42.37 (18.5) | |
| Profession | | |
| None | 40.0 (18.4) | 0.257 |
| Housewife | 37.1 (16.3) | |
| Teacher | 40.8 (16.1) | |
| Crafts man | 37.5 (18.0) | |
| Engineer | 40.2 (15.9) | |
| Merchant | 38.8 (18.6) | |
| Other | 41.1 (19.2) | |
| Monthly income (JD) | | |
| ≤ 250 | 39.2 (17.6) | 0.092 |
| > 250 | 42.0 (19.1) | |
| Residence | | |
| Urban | 40.3 (18.0) | 0.192 |
| Rural | 38.3 (17.6) | |

SD = standard deviation; JD = Jordanian dinar (JD 1 = US\$ 1.4).

studies conducted in the United Kingdom, which show that around 30%–38% of the sample thought that antibiotics were effective for common cold and cough. The level of knowledge demonstrated among the British sample is, however, much better than that among our sample with regard to this item [18,19]. In a Swedish study only 19.1% agreed that antibiotics can be used to cure common colds [20]. This higher knowledge can be attributed in part to the multiple educational campaigns conducted in these countries [21]. In another study from Hong Kong, 26% of the sample believed that antibiotics were needed for symptoms of upper respiratory tract infections if they felt sick enough to seek medical care [22]. Conversely, in a study carried out on patients visiting clinics in New York, 70% thought that antibiotics

must be used for viral infections [23], similar to our own findings.

Despite the general knowledge deficit observed in our study, patients aged ≥ 41 years and those with a higher level of education constituted the majority of patients expressing better knowledge about antibiotics. These findings suggest that education and age may have a positive effect on awareness about antibiotics. These results are comparable to those reported in recent studies from neighbouring Syria [24], and from Hong Kong [22].

We found that 21.3% of the participants were willing to self-medicate with antibiotics if they thought the antibiotics were good for their condition. In Hong Kong, only 9% of respondents to a telephone survey had acquired antibiotics without a prescription [22]. Across European countries self-medication with

antibiotics ranged from 2% to 35%, with an overall prevalence of 10% [25]. In a recent cross-sectional public survey in Syria, only 43% were prescribed the antibiotic by a physician to treat the condition, while 57% used an old prescription or took someone else's advice [24]. In Egypt, 24% of mothers attending the outpatient clinic of Ain Shams University Paediatric Hospital prescribed antibiotics to their children [26]. Recent studies from Jordan have reported a self-medication rate with antibiotics of about 40% [4,16].

Public education campaigns have been shown to be a successful tool for raising public awareness about antibiotics [12,27,28]. Other studies, however, have found that public awareness campaigns about antibiotics had no effect on the level of knowledge or the types of interventions desired by participants [21,29]. In that respect, a recent study from Jordan reported varying level of awareness of bacterial resistance among health-care professionals [30], which indicates, taken with the results of the current study, the urgent need for serious educational efforts for both the public and the medical professionals. Educational programmes could take several forms, including brochures and posters, public lectures and seminars, public media such as television, radio and social networks on the Internet, to post advertisements, programmes and lectures encouraging the proper use of antibiotics.

This study was limited to individuals referred to the hospitals where the study was conducted. More males were included in the study than females, which was not under our control as there was no intention to recruit higher numbers of either sex. The study did not assess whether the participants perceived the possible complications of antibiotic resistance.

On the other hand, this study, addressed the main points that merit attention when knowledge about antibiotic is the concern. It addressed knowledge about the different indications for prescribing antibiotics plus their side-effects. It also assessed how willing the participants were to

self-medicate with antibiotics. As a result, this study provides decision-makers with important information about which areas of knowledge about antibiotics to target when preparing an educational campaign about the use of antibiotics.

Our findings showed a low level of knowledge among the sample population, which indicates there is a need for the

establishment of a national educational campaign that focuses on the proper use of antibiotics for minor ailments. In addition, information about the complications associated with antibiotic resistance should be included in these educational campaigns. Stronger legal restrictions should be introduced on the selling of antibiotics in community pharmacies.

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