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Original Article

A Cross-Sectional Study of Patients' Practices, Knowledge and Attitudes of Antibiotics among Iraqi Population

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Abstract

Introduction: The misconception and misuse of antibiotics among the public has been widely outlined to be one of the main reasons for bacterial resistance. The aim of the present study was to assess the practices, level of knowledge and attitudes regarding the rational and self-medication use of antibiotics in the general public in different districts of Baghdad province, Iraq.

Methodology: A descriptive, cross-sectional study conducted among 384 participants through an interview using a structured 3-parts questionnaire, consisting of 24 items assessing the demographic characteristics, practices, level of knowledge and attitude towards rational antibiotics use.

Results: 45.8% of the study participants reported self-medication of antibiotics without prescription. Flu/common cold and sore throat represented the majority of medical conditions for antibiotics intake without prescription (44.9%, 31.3%) respectively. Oral amoxicillin (34.1%) was the most common non-prescription antibiotic. 50.3% had education about the rational use of antibiotics. 41.4% reported intake of antibiotics after having medical advice, 44% suggested their antibiotics not to be used by other members, and 52.9% stated the importance of antibiotic education among the public. However, 57% of the respondents had negative attitudes regarding antibiotics use for sore throat/fever, the effectiveness of antibiotics for cold/flu (54.7%) and cough (49.2%), to keep antibiotics for future use (40.9%) and not completing the antibiotic course after feeling well (49.2%).

Conclusions: A widespread use of antibiotics without prescription was reported, providing some crucial gaps and a lower level of practice, knowledge and attitudes regarding the use of antibiotics among a sample of the Iraqi population.

Key words: Antibiotics misuse; attitudes; Iraq; knowledge; practice; self-medication.

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Introduction

Antibiotics are one of the most commonly purchased drugs that have played an elemental role in the control and management of infectious diseases. The clinical use of these medicines whether for preventive or curable aim has improved patient-related outcomes and quality of life [1]. Earlier literature reported that 20-50% of inpatients are treated with antibiotics primarily at the intensive care units (ICUs) and haematology-oncology departments, 85% at non-ICU wards and 90% are being used in outpatients [2,3]. However, the effectiveness of antibiotics becomes seriously critical as the irrational and overuses of these medicines results in an increased rate of infections with resistant bacterial strains. This becomes not a globally growing problem that contributes to real threats on public health but also has been associated with delayed duration of therapy, prolonged hospitalization, treatment failure, increased mortality rate and increasing cost of treatment [4]. Moreover, the real threat of antibiotic resistance is increasing at an alarming magnitude making even simple infections untreatable or routine medical procedures almost impossible within the next coming years [5]. Literature also estimates the average death of 25,000 people annually in Europe due to bacterial resistance [6]. Both healthcare professionals and patients are responsible for this medical problem of antibiotic resistance. In one hand, this is most likely due to inappropriate prescribing by the healthcare professionals and in another hand, most likely related to unnecessary/overuse of self-medication without a prescription particularly broad-spectrum antibiotics, suboptimal dose choices, skipping of doses, sharing medication with other people, keeping part of the course for another occasion and failure to complete treatment [7-10]. It has been estimated that more than

50% of the antibiotics worldwide are sold without a medical prescription. Despite the fact that dispensing antibiotics without a prescription is considered as illegal and prohibited in most of the countries, this does not mean that antibiotics are not sold over-the-counter (OTC) sales in these countries [11,12].

Poor patients' knowledge and attitudes and increased self-medication with antibiotics have been widely outlined to be the main reason for the inappropriate use of these medicines and to be one of the important contributions for spread and emergence of bacterial resistance. Based on this, enhancing the public knowledge about the appropriate use of antibiotics through educational interventions has been strongly advocated as an essential component of any programme designed to reduce the misuse/overuse of these medicines and to influence long-term prescribing behaviour of antibiotics [13,14]. Therefore, it is necessary to assess the level of knowledge and attitude of the public towards the use of antibiotics in order to find out what education the public may need. The aim of the present study was to assess the practices and level of knowledge and attitudes regarding rational and self-medication use of antibiotics in the general public in different parts and districts of Baghdad province, Iraq.

Methodology

Study design and population settings

This was a descriptive, cross-sectional study involving patients' enrolment from December 2018 to February 2019. A convenient sample of participants was selected from both genders and different age groups older than 18 years of age. All study participants who expressed willingness, agreement and the ability to take part were fully informed about the proposed study and provided with written informed consent. The study was approved by the ethical committee of the human research ethics committee of Pharmacy Department, Osol Aldeen University College, Baghdad province, Iraq (04. 25.11.2018). In order to ensure generalizability and minimize selection bias, a four-step sampling approach was achieved involving the following procedure: first, the two main parts (divisions) of Baghdad province were selected (Al-Karkh and Al-Rusafa). Second, each of these two parts was divided into four locations (south, north, east, and west). Third, a list of districts within each of these eight locations was collected and two of the most populous districts from each location were selected using random numbers. Finally, community pharmacies were selected by convenience sampling within each of the two selected districts.

Questionnaire design

As aforementioned, all data were collected from the community pharmacies in Baghdad province, Iraq. The information was gathered via a structured self-administered questionnaire that was developed for the purpose of the present study, distributed and filled by direct interview with the participants. The questionnaire was developed after a thorough and comprehensive literature search in well-known databases, such as PubMed, Google Scholar, and Scopus and customized to suit the study purpose. The questionnaire was translated from English into Arabic language and subjected to a process of forwarding and backward translation. Additionally, questions were reworded, reformatted, and reordered in light of the feedback received. The face and content validity of the drafted questionnaire was validated and performed by two academicians from the pharmacy and medical background with extensive experience in survey-based research and two community pharmacists. Furthermore, a preliminary test was applied to a representative sample for around 5% of the target sample (n=19) to address any ambiguity in the questions and to determine whether the data would provide reliable information. The data collected during this pilot part of the study were excluded from the final data statistical analysis.

The final version of the questionnaire consisted of 24 questions divided into three sections. The first section (four items) gathered data on demographic characteristics of the participants, including age, gender, educational level and types of dispensing antibiotics therapy. The second section (eight items) gathered data to assess the practices about the rational use of antibiotics, including the type of the infectious conditions based on a current usage of prescription, types of antibiotics administered based on current usage of prescription, medical conditions for the current intake of antibiotics as self-medication without prescription, types of antibiotics would be taken as self-medication without prescription, the previous source of antibiotic procurement, provision of proper education about the rational use of antibiotics, the source for the previous of education about the rational use of antibiotics, previous times for dispensing antibiotics as self-medication without prescription. The third section consisted of twelve items which evaluated participants' knowledge and attitudes about the rational and self-medication use of antibiotics and the respondents were given options of 'agree', 'disagree', and 'not sure' to choose from.

Statistical analysis

Data were analysed using statistical package for social science (SPSS) version 23.0 and Microsoft Office Excel 2013. By using Cochran's sample size formula, a sample size of a large population whose degree of variability is not known and assuming the maximum variability and taking 95% confidence level with ±5% precision, the sample size required was 384 participants. Descriptive analysis was used to describe the study population, and the results were expressed in numbers, percentages, means, and standard deviations for each of the characteristics, and in terms of all questions relating to knowledge and attitude towards antibiotic use. A score of 1 was given to positive knowledge and attitude while a score of 0 was given to negative knowledge and attitude towards every statement. Knowledge and attitude scores for individual statements were summed up and calculated to give the total attitude score of a participant. A cut-off level of < 7 was set for negative attitude and ≥7 for a positive attitude. The Chi-square test was used to study the association between groups. P-value was considered significant at < 0.05 and highly significant at < 0.01.

Results

Regarding the socio-demographic characteristics of the study participants, the mean age of the respondents was 34.5 ± 14.7 years. The majority of the study participants were males (54.7%) and possessed a university level qualification (49.2%). The largest percentage was in 30–60 year age group (72.1%) that constituted nearly three-quarters of the study participants. More than half of the study participants (54.2%) reported having antibiotics using a prescription, while the remaining 45.8% of the study participants reported self-medication of antibiotics without prescription, as shown in Table 1.

Table 1. Demographic Characteristics of the Study Participants.

Variables	n (%)
Gender	
Males	210 (54.7)
Age range (years)	
18-30	76 (19.8)
31-60	277 (72.1)
>60	31 (8.1)
Educational level	
No formal education	54 (14.1)
Primary	78 (20.3)
Secondary	63 (14.6)
University	189 (49.2)
Types of dispensing antibiotics therapy	
Under a prescription	208 (54.2)
Self-medication without prescription	176 (45.8)

In the present study, respiratory tract infections (RTIs) represented the majority of the infectious conditions undergoing treatment based on current usage of prescription (64.4%), followed by genital infections

Table 2. Antibiotics Dispensing and Practices among Study Participants.

Variables	n (%)
Infectious conditions undergoing treatment based on a current usage of prescription (n = 208/384)	
GITIs	10 (4.8)
RTIs	134 (64.4)
Skin	16 (7.7)
Genital	27 (13)
UTIs	21 (10.1)
Types of antibiotics administered based on a current usage of prescription (n = 228)	
Amoxicillin	73 (32)
Azithromycin	44 (19.3)
Cefixime	27 (11.8)
Co-amoxiclav (amoxicillin-clavulanic acid)	25 (11)
Tetracycline	15 (6.6)
Ciprofloxacin	13 (5.7)
Metronidazole	11 (4.8)
Cefotaxime	11 (4.8)
Gentamicin	9 (4)
Medical conditions for current intake of antibiotics as self-medication without prescription (n = 176/384)	
Flu/common cold	79 (44.9)
Sore throat	55 (31.3)
Cough	31 (17.6)
Cystitis	11 (6.2)
Types of antibiotics would be taken as self-medication without prescription (n = 176)	
Amoxicillin	60 (34.1)
Cephalexin	49 (27.8)
Azithromycin	24 (13.6)
Cefixime	17 (9.7)
Co-amoxiclav (amoxicillin-clavulanic acid)	15 (8.5)
Ciprofloxacin	11 (6.3)
Previous source of antibiotic procurement (n = 384)	
Community pharmacy	221 (57.6)
Hospital pharmacy	77 (20)
Stock at home	86 (22.4)
Provision of proper education about rational use of antibiotics (n = 384)	
Yes	193 (50.3)
No	191 (49.7)
Source of provision of education about rational use of antibiotics (n = 193)	
Physician advice	71 (36.8)
Pharmacist advice	98 (50.8)
Pharmacy technician advice	2 (1.0)
Nursing advice	5 (2.6)
Medical reference on the internet or media	17 (8.8)
Previous times for taking antibiotics as self-medication without prescription (n = 384)	
Once time/week	87 (22.7)
Once time/month	151 (39.3)
More than 2 times/month	52 (13.5)
More than 3 times/year	94 (24.5)

GITIs: Gastrointestinal tract infections; RTIs: Respiratory tract infections; UTIs: Urinary tract infections.

and urinary tract infections (UTIs) (13%, 10.1%) respectively. Amoxicillin (32%), azithromycin (19.3%), cefixime (11.8%) and co-amoxiclav (11%) were the most common antibiotics administered based on a current usage of prescription, as shown in Table 2.

Regarding antibiotics dispensing and practices, flu/common cold and sore throat represented the majority of medical conditions for the current intake of antibiotics as self-medication without prescription (44.9%, 31.3%) respectively. Accordingly, oral antibiotics, including amoxicillin (34.1%), cephalexin (27.8%) and azithromycin (13.6%) were the most common non-prescription antibiotic would be taken. In addition, 57.6% of the study participants reported that community pharmacy was the main previous source of antibiotic procurement, as shown in Table 2.

On the other hand, half of the study participants (50.3%) had proper education about the rational use of antibiotics. Consequently, 50.8% of those participants stated that pharmacists were the most common source for the provision of education about the rational use of antibiotics followed by physicians (36.8%). The majority of the study participants reported that they were taking antibiotics as self-medication without prescription once time per month (39.3%), as shown in Table 2.

In the present study, a total of 5 out of 12 positive knowledge and attitudes about the rational and self-medication use of antibiotics reported by the study participants regarding not taking antibiotics without a prescription or medical advice (41.4%), not using leftover antibiotic of a previously prescribed one (43.5%), not taking antibiotics from the retail pharmacy without having medical advice about symptoms and illness (36.2%), not suggesting my antibiotics to be used by family members/friends (44%) and the importance of enhancing antibiotic education among the public (52.9%). However, the majority of the study participants had negative attitudes regarding the use of antibiotics for sore throat and fever (57%), the effectiveness of antibiotics for flu/common cold (54.7%) and cough (49.2%), antibiotics are safe drugs (40.9%), to keep antibiotics for future use (40.9%), not completing the antibiotic course after feeling well (49.2%), as shown in Table 3. The present study also revealed that there was a statistically significant difference in the level of knowledge and attitude to antibiotic use (positive) with regard to male gender (57.1%; $p = 0.0001$) and university education level (77.2%; $p = 0.0001$), but negative knowledge and attitude to antibiotic use with regard to different age group (31-60 years; $p = 0.0001$), as shown in Table 4.

Discussion

This study revealed that a high percentage of the study participants (45.8%) reported self-medication of antibiotics without prescription. This is in line with a study by Shehadeh *et al.* [19] which revealed that antibiotics being used without physician's consultation either directly from pharmacies as OTC (35%), or left-over antibiotics (49%). However, the findings of the present study are higher than those reported by McNulty *et al.* (5%), Ling Oh *et al.* (7.6%) and You *et al.* (9%) [17, 20, 21], but lower than that reported by

Table 3. Knowledge and Attitudes about the Rational and Self-Medication Use of Antibiotics among Study Participants.

Statements	Agree N (%)	Disagree N (%)	Not sure N (%)
Antibiotics are useful for sore throat and fever	219 (57)	89 (23.2)	76 (19.8)
Antibiotics are effective against symptoms of a viral origin such as flu/common cold	210 (54.7)	93 (24.2)	81 (21.1)
Antibiotics are effective for cough lasts more than a week	189 (49.2)	104 (27.1)	91 (23.7)
Antibiotics are safe drugs without adverse effects	157 (40.9)	143 (37.2)	84 (21.9)
Antibiotics can be taken without a prescription or medical advice most of the time depending upon the product leaflet	130 (33.9)	159 (41.4)†	95 (24.7)
Using leftover antibiotic of a previously prescribed one without medical advice in the case of repeated illness	112 (29.2)	167 (43.5)†	105 (27.3)
Taking antibiotics from the retail pharmacy without having medical advice about my symptoms and illness	103 (26.8)	139 (36.2)†	142 (37)
Keeping antibiotics at home for future illness and emergency use	157 (40.9)	119 (31)	108 (28.1)
Discontinuing antibiotics use once symptoms subside and feeling well even before completing the course of treatment	189 (49.2)	109 (28.4)	86 (22.4)
Suggesting my antibiotics to be used by family members/friends when there is a need without medical advice	117 (30.5)	169 (44)†	98 (25.5)
Misuse of antibiotics causing resistance and this is an issue to the society	132 (34.4)	73 (19)	179 (46.6)
Enhancing antibiotic education among the public is necessary but not mandatory	203 (52.9)	69 (18)	112 (29.1)

†: Positive outcomes.

Table 4. Association of Demographic Characteristics with the Knowledge and Attitudes among Study Participants.

Variable	Knowledge and Attitude Toward Antibiotics		p-value
	Positive N (%)	Negative N (%)	
Gender			
Males	120 (57.1)	90 (42.9)	0.0001
Females	82 (47.1)	92 (52.9)	
Age range (years)			
18-30	32 (42.1)	44 (57.9)	0.0001
31-60	135 (48.7)	142 (51.3)	
>60	18 (58)	13 (42)	
Educational level			
No formal education	12 (22.2)	42 (77.8)	
Primary	22 (28.2)	56 (71.8)	0.0001
Secondary	39 (62)	24 (38)	
University	146 (77.2)	43 (22.8)	

Jifar and Ayele (65%) [16], and by Alqarni and Abdulbari (57.6%) [22].

A study by van der Velden *et al.* [23] found that upper RTIs account for 57% of the antibiotics used. Moreover, the same study found that UTIs are the next most common infectious conditions encountered. Pouwels *et al.* [24] in a study to evaluate the duration of prescriptions for antibiotic treatment found that bronchitis and other RTIs were the most common infections for antibiotics being prescribed and treated in English primary care. Similarly, Hashemi *et al.* [25] in a study to assess the outpatient usage of antibiotics in teaching hospitals found that upper RTIs (29.2%) were the most common reasons for prescribing antibiotics. Similar to the literature, the findings of the present study revealed that RTIs, genital infections and UTIs were the most common infectious conditions for the prescription of antibiotics. The most common types of prescribed antibiotics by general practitioners in primary care in a study conducted in Ireland found that co-amoxiclav (27%), amoxicillin (15%) were the most commonly prescribed antibiotics [26]. Hashemi *et al.* [25] also found that co-amoxiclav (15.7%), amoxicillin (4.2%), cefixime (16.2%), cephalexin (6.7%) and azithromycin (12.8%) were the most common antibiotics dispensed by prescription. The dispensed antibiotics in the study of Hashemi *et al.* [25] were nearly comparable to those of the present study for co-amoxiclav, cefixime, higher for amoxicillin and lower for azithromycin.

Frequent prescribing of antibiotics for viral RTIs, which in the majority are considered self-limiting, might influence the public thoughts of the antibiotics effectiveness in the treatment of these infectious conditions [27]. Based on the recommendations from the National Institutes for Clinical Excellence (NICE), antibiotics should not be prescribed for all patients with upper RT symptoms, but should be considered in either in high risk patients, such as those with further complications or with other comorbidities. In the USA, approximately 50–75% of antibiotics administered within both the hospitals and community settings were prescribed for viral RTIs [28].

The proportion of inappropriate dispensing antibiotics without prescriptions varies in the European countries, significantly higher in Bulgaria (34%), Cyprus (31%) and Malta (30%), particularly for flu and sore throat [29]. Meanwhile, in Poland, the prevailing reasons for irrational taking of antibiotics were common cold (30%), sore throat (23%), flu (16%) and cough (15%) [30]. In Malaysia, in a study conducted by Ling Oh *et al.* [17] found that 38% of the respondents would take antibiotics for cold and 40.7% for fever. This could be related to that most pharmacies in developing countries dispense antibiotics on patient demand and pressure, commercial interests, and weak regulations [31]. Similar to literature, in the present study, participants often use antibiotics as self-medication without prescription to cure a cold/flu and sore throat symptoms (44.9, 31.3%), respectively. For common cold/flu, this is lower than findings by Hadi *et al.* (68.4%) [32], and by Mason *et al.* (64%) [33], but higher for sore throat (24%) in the study of Mason *et al.*

Accordingly, penicillins (amoxicillin), cephalosporins (cephalexin) and macrolides (azithromycin) were the most common non-prescription antibiotics would be taken by the participants of the present study. Interestingly, Hadi *et al.* [32] in a cross-sectional study to evaluate the practices towards dispensing antibiotics in community pharmacies found that penicillins (72.5%), cephalosporins (63.5%) and macrolides (40.7%) were the most common antibiotic classes dispensed without prescription. Furthermore, common cold prescriptions from village clinics in China contained a prescription

for an antibiotic more than prescriptions from other institutions (71% vs. 44%, $p < 0.001$) [34].

Patient education is the best strategy for reducing antibiotics misuse particularly by physicians which can be highly successful in raising public awareness and reducing antibiotics misuse [35]. However, considering that the majority of prescribed antibiotics occur in community pharmacies, this highlights the responsibility of pharmacists to educate patients and improve public understanding about the antibiotics misuse and resistance [36]. This could be achieved through pharmacist involvement in patient education about preventing unnecessary and irrational use of antibiotics, promoting adherence to appropriate prescribing guidelines, decreasing demand on antibiotics for viral upper RTIs and increasing adherence to prescribed antibiotics. Previous studies revealed that pharmacist educational intervention appeared to improve public knowledge about proper and safe medication use with improved patient-related outcomes [37-40]. Furthermore, collaborative practices between pharmacists and physicians could curb the misuse of antibiotics and resistance [41]. Similar to previous studies, the findings of the present study revealed that half of the study participants stated that pharmacists were the most common source for the provision of education about the rational use of antibiotics.

The results of our study showed that the study participants displayed an encouraging level of knowledge and attitudes regarding not taking antibiotics without a prescription or medical advice (41.4%), not using leftover antibiotic of a previously prescribed one (43.5%), not taking antibiotics from the retail pharmacy without having medical advice about symptoms and illness (36.2%). These findings are lower than that found in a study by Jifar and Ayele [16] in which 87.2% of the respondents were not using leftover antibiotics in the event of repeated illness. Moreover, the findings of the present study are lower than that found in a study by Hassali *et al.* [15], Jifar and Ayele [16] and Lim and Teh [18] in which only a small proportion of respondents claimed that they used antibiotics without consulting physicians (18.75%, 10%, 23.9%), respectively. In the current study, there might be several contributing factors for not getting a medical consultation and advice for minor ailments, such as inconvenience, high cost or lack of necessity of visiting a physician. These are particularly related to financial constraint and lack of medical insurance for the majority of the Iraqi population [15,42]. This may urge the public to use non-prescription antibiotics without consulting a healthcare professional. Furthermore, this will increase the risk of incorrect diagnosis, incorrect drug intake, incorrect dose and manner of drug administration, frequent occurrence of drug-related problems, including adverse drug reactions and drug interactions [43]. Similarly, 44% of the respondents not agreed to suggest antibiotics to be used by family members/friends, which is higher than the study done in Malaysia in Penang province (11.8%) [17] and Putrajaya province (17.0%) [18].

The results of our study showed that the level of knowledge and attitudes about the rational and self-medication use of antibiotics is inadequate among study participants in Baghdad province, illustrated in seven incorrect responses out of twelve. Respondents exhibited a poor level of knowledge toward the use of antibiotics for sore throat and fever (57%), the effectiveness of antibiotics against common cold/flu (54.7%) and cough (49.2%). Those participants who did agree were as likely to have antibiotics once time per month. This misuse and inappropriate practice of using antibiotics to treat these minor ailments will increase the risk of antibiotic resistance. Furthermore, the misuse of antibiotics revealed the poor understanding of the difference between bacterial and viral infection and the beliefs that antibiotics have the capability to work against both of these infections. A possible reason for this negative perception could be related to the use of the generic term "germ" in place of the more specific term "bacteria" or "virus" during the provision of medical advice to the general public. Moreover; frequent prescriptions of antibiotics for viral RTIs have affected the public views for this misunderstanding and wrong beliefs, [18,43]. One-third of adults in the United Kingdom incorrectly agreed that antibiotics work on most cold and cough and 43% incorrectly agreed that antibiotics have the ability to kill viruses [20]. This inappropriate practice was widely outlined in the literature reported by Shehadeh *et al.* [19] in a study to assess knowledge, behaviour and attitude toward antibiotics use, which found that 67.1% of the adult Jordanians believed that antibiotics treat common cold and cough, and more than half (51.2%, CI 48.3–54.1) had been prescribed antibiotics to treat common cold symptoms. Similarly, Jifar and Ayele [16], and Lim and Teh [18] reported that the majority of the respondents (83%) had misunderstood that antibiotics can be used to speed up recovery from cough. However, our findings are at a higher rate than that in a study in Malaysia [15] where only a small proportion of respondents who thought antibiotics are effective for common cold and cough (30%).

Stopping taking a full course of antibiotics is associated with a high frequency to get bacterial resistance to antibiotics in the community. Completing the course of the regimen was another area where the participants of the present study demonstrated deficiency and revealed another incorrect level of knowledge as nearly half of the respondents (49.2%) stated that they not completing the antibiotic course after feeling well. This is also in agreement with the study of Alqarni and Abdulbari [22] in which half of the participants (50.9%) stopped taking antibiotics when they feel better. These findings are in contrast to those observed in Malaysia [16] where most of the respondents (60.5%) had correct knowledge of the need to complete the full course antibiotics even if their symptoms subsided. In the current study, a considerable proportion of participants (40.9%) agreed that they keep antibiotics at home for future use in case of emergency; however, this result is relatively better than the previous findings that reported a proportion of 80.1%, and 83% [17,18].

The present study revealed that there was a statistically significant negative level of knowledge and attitude to antibiotic use with regard to the age group (30-60 years). This in contrast with the results of studies conducted in Malaysia [17], Jordan [19] and Saudi Arabia [22], which indicated that the younger populations between the ages of 18-30 years had poor knowledge regarding antibiotic use. An interesting finding of the present study is that the knowledge and attitude with regard to antibiotics across different educational levels showed statistically significant differences. Those respondents who had received a higher (university) education showed a higher level of knowledge and a more positive attitude toward antibiotics use and these are in agreement with earlier studies [18,30]. However, the participants who being educated and got a previous knowledge about antibiotics, is an independent factor associated with self-medication of antibiotics and taking antibiotics directly from the pharmacy without a physician's consultation. Therefore, knowledge-based health education programs should be more deduced particularly to those individual with low levels of education.

In Iraq, despite the regulations of Ministry of Health which restrict antibiotics as prescription-only medications, there are still wrong practices followed by some pharmacists that raised the inappropriate antibiotics dispensing without prescription. Further restrict strategies need to be employed to monitor the irrational dispensing of antibiotics, thereby enforce prohibiting OTC sales of antibiotics from community pharmacies. These could be performed through media campaigns for the general public and educational activities for healthcare workers, retention of prescriptions for antibiotics dispensing by pharmacies, urging pharmacists to dispense antibiotics based on the number of days and a fine to be imposed on the pharmacies which dispense antibiotics as OTC without a medical prescription issued by physicians. Another principle key strategic objective to prevent the irrational practices of antibiotics consumption is to improve the awareness and understanding of antimicrobial resistance through effective communication and education to the public. There is a potential for pharmacists to have a greater impact mitigating antibiotics misuse in the community and hospital settings as they are considered as important members of the healthcare team, medicine experts, have easy and frequent contact with the general public, trained to enhance patient education on the proper use of antibiotics, the importance of completing the prescribed treatment and avoid self-medication [44].

Conclusions

To the best of our knowledge, this is the first cross-sectional study conducted to assess the practices, level of knowledge and attitudes regarding rational and self-medication use of antibiotics in the general public in different parts and districts of Baghdad province, Iraq. The study revealed a high rate of inappropriate and of self-medication use of antibiotics and also displayed some crucial practical gaps, low level of knowledge and attitudes among the Iraqi community. The study emphasized on the need of the educational interventions to decrease misconceptions and to improve basic knowledge of antibiotics use and its association with drug resistance. The study also highlighted that more national regulatory efforts are required to plan and establish future interventions to reduce over the counter sales to the general public and to improve the appropriate use of antibiotics.

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