

## Knowledge, Attitudes and Practice toward Antibiotic Use among Under and Post-Graduate Students at Yarmouk University in Jordan: A Descriptive Study

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### ABSTRACT

**Objective:** Irrational and overzealous use of antibiotics in addition to multidrug resistance has increased at an alarming limits around the world. This study aimed to evaluate the knowledge and practices toward antibiotic use among students at Yarmouk University

**Material and Method:** A cross-sectional descriptive survey using a structured electronic version of valid questionnaire was distributed among participants. Google form was prepared based on available questionnaire in literature, revised by a group of academic pharmacist to validate the questionnaire. Test-retest was performed for a small group and cronbach alpha was calculated. The form was distributed randomly among under- and postgraduate students at Yarmouk University via their mails.

**Results:** A total of 1154 individuals who completed questionnaires were analyzed. The knowledge of antibiotic use and resistance was quite good; 72.7% reported correct responses with a mean score of 16 out of 22. High rates of antibiotic use were found with 92% of respondents used antibiotics in the past three months. Inappropriate practice toward antibiotic was common; 48% used it for incorrect indication (e.g., common cold, fever, and pain), 60% used for improper duration and 20% don't take the correct doses.

**Conclusions:** Interventions on enhancing awareness and understanding of rational antimicrobial use are highly recommended by promoting expert-driven behavioural change, effective communication, education and training. Furthermore, law restriction on antibiotic dispensing should be introduced.

**Keywords:** Antibiotic, Attitude, awareness, Jordan, rational use.

### INTRODUCTION

Overzealous prescription and pharmacy-based dispensing of antibiotics without a prescription are considered a major problem worldwide especially in developing countries [1, 2]. The global problem of antibiotic abuse is owed to various factors including a defect in applying regulations that control dispensing

antibiotics, easy accessibility of antibiotics without a prescription from pharmacies, and availability of cheap alternatives in the pharmaceutical market [3, 4]. Additionally, health policies with regard to medical insurance and lack of physicians' concerns about long term resistance may explain the irrational use of antibiotics [5, 6,]. Social and educational factors such as lower educational status, lower knowledge of antibiotics could also contribute to the irrational use of antibiotics [7]. Besides, hazards of untoward reactions and the economic overload on the national health system, overuse of

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antibiotics potentially will lead to the growth of resistant bacterial strains and the creation of even multidrug-resistant bacteria [8].

Previously, many studies investigated different patterns of irrational use of antibiotics [9, 10]. A study by Al-Azzam and his colleagues reported a high prevalence of non-prescription use of antibiotics in Jordan [11]. Other studies mentioned that regulation of antibiotic prescription by general practitioners is lacking [12, 13]. Recently, Jarab and his colleagues (2018) observed a shortage in the implementation of guidelines for antibiotic use [14]. A systematic review by Sajal, et al. (2018) mentioned Budwall's note that pharmacists should have an active role in improving antibiotic prescription practice by general practitioners [15, 16]. Similarly, regulatory laws that prevent the un-prescribed dispensing of antibiotics to the adult are present but are not implemented in community pharmacies, which defy the purpose of the legislation of such laws [17].

Antibiotic resistance is a deleterious worldwide problem accelerated by the misuse and overuse of antibiotics, as well as poor infection prevention and control. It is considered a serious global threat [18]. Steps can be taken at all levels of society to reduce the impact and limit the spread of resistance [19]. The general public can help by taking actions such as using antibiotics when prescribed by a certified health professional, always taking the full prescription, never using left-over antibiotics, and never sharing antibiotics with others. Prescribers also should respond to people's expectations and demands, so increasing everyone's understanding of when antibiotics may be of benefit, and when not, should decrease the frequency that they are offered.

Relatively, little is known about the general public's knowledge of antibiotic resistance in Jordan. A previous pilot study [20] was conducted in Amman, and due to the difference in the demographic structure between Amman and Irbid city, the results of this study could not be generalized to the population of Jordan. As complementary to their work, this study could be helpful

to gather more information from the northern part of Jordan (Irbid City).

Yarmouk University is a non-profit public higher-education institution located in a large city of Irbid with enrollment range: 40,000-42,999 students from all regions of Jordan. Yarmouk University (YU) offers courses and programs leading to officially recognized higher education degrees such as bachelor degrees, master degrees, doctorate degrees in several areas of study. This study aimed to evaluate the knowledge and practice of antibiotics use, convey health-related information, and evaluate awareness of antibiotic use and bacterial resistance.

## **MATERIAL AND METHODS**

### ***Study design & Setting***

A descriptive study was conducted using a pretested, pre-validated structured, and the anonymous questionnaire. The sample size was assessed based on the reports from worldometer.info website: (<https://www.worldometers.info/world-population/jordan-population>), which mentioned that the population in northern Jordan is about 2 million and also according to previous studies reporting that the prevalence of antibiotic self-medication may range from 27% to 91.7%. The  $\alpha$ -level was set at 5% so that we had a 95% confidence interval (CI) [21]. A preliminary test was elaborated on a 45-participant representative sample (about 4% of the target sample) to address any questions' ambiguity and to determine if the data would provide reliable information. Participants of the pilot study provided the researcher with any feedback they had about the questionnaire items. The feedbacks were considered thoroughly in preparing the final version of the questionnaire that was reviewed by a committee consists of three academic pharmacist and a physician. To be sure that the sample of the present study is random and generalizable, the form has been shared randomly to the entirety of Yarmouk University's students mailing list, which includes all of the University's students. Students from medical and pharmacy colleges were excluded from the final analysis.

### **Instrument**

In this research, a professional electronic version of a valid Arabic questionnaire; that was approved to be valid among the Jordan community, was distributed among participants in Northern Jordan. Shehadeh et al., [20] have developed a questionnaire by reviewing available questionnaires in the literature [22-24]. By then, they translated it to Arabic, tested its content validity and construct validity, and an acceptable Cronbach's alpha was found. To be valid for use, the questionnaire was shortened to 22 items in order to make it easier to fill out and increase the number of full responses.

The questionnaire covered the three key points:

1. Knowledge regarding the indications and correct antibiotic use: the purpose of using antibiotics for bacterial or viral diseases; as common cold and infections, when to take it regarding food, duration, what do you do if you miss a dose, etc.

2. Resistance due to misuse: Causes of antibiotic resistance (unnecessary use, not completing the course, no physician's prescription (e.g. self-medication; over-the-counter OTC), using antibiotics with other drugs.

3. Safety: Antibiotic side effects such as allergies.

To enhance the respondents' knowledge and correct their misconceptions, an infographic designed by the World Health Organization (WHO) through visuals using WHO infographic, was shown at the end of the survey. Infographics are embraced because they can rapidly grab attention, simplify complex concepts, and connect components of complex concepts [25, 26] This may help to develop proper interventional programs to improve the public knowledge of antibiotics use, and hence, take a step

towards controlling antibiotics resistance.

### **Statistics**

The present work is considered a purely descriptive cross-sectional study. It described the sample characteristics and involved the rate of respondents to each question of the 22-item questionnaire to assess their knowledge and awareness about the use of antibiotics. . Frequency distributions and descriptive criteria were examined. Means for continuous variables and percentages for categorical variables were computed. The knowledge with regard to the purpose for using antibiotics, resistance, and safety was assessed by calculating the number of correct responses out of 22 items. Poor knowledge: scores of 1 (<50% correct response), adequate knowledge: scores of 2 (50-70% correct response), and good knowledge: scores of 3 (>70% correct response) [20]. The reliability of the questionnaire was assessed by calculating the alpha Cronbach's coefficient, which was found to be satisfactory (alpha-Cronbach = 0.71).

### **Ethical issues**

Ethical approval was granted from Institutional Review Board- at Yarmouk University with number (IRB/2021/43)

## **RESULTS**

A total of 1154 respondents matched the the inclusion criteria of the research successfully completed the questionnaire. The mean age for all participants ( $\pm$  SD) was  $24.6 \pm 2.3$ , with 89.4% aged between 18–25 years and mostly were female (791, 69%). Table 1 presents the demographic characteristics of the study participants.

**Table 1: Demographic characteristics of the participants**

<b>Characteristics</b>	<b>N (%)</b>
<b>Gender</b>	
Female	791 (68.6)
Male	363 (31.4)
<b>Age</b>	

Characteristics	N (%)
18-25	1032 (89.4)
26-35	99 (8.6)
>35	23 (2)
<b>Education</b>	
Undergraduate	1037 (89.9)
Postgraduate	117(10.1)
<b>Marital status</b>	
Single	1048 (90.8)
Married	106 (9.2)

The knowledge score of antibiotic use and resistance of all respondents are quite moderate; 72.7% reported correct responses with a mean score of 2 (adequate knowledge) (Table 2). The results revealed that only half (51.6%) of the sample knew that antibiotics are used for bacterial infections like tonsillitis and tooth infection, 79.9% of respondents knew what dose should they use, with half of them (47.8%) read the dose from internal leaflet, 82.2%

aware that antibiotics should be ingested with water not by other drinks as tea or coffee however, about 60.8% did not know what should be the correct duration for antibiotic use. Knowledge about antibiotics resistant was quit good with three quarters (76.9%) knew something about it and 66.2% stated that resistance may be due to using antibiotics for unsuitable un infective diseases, taking improper doses, or using them for the improper duration.

**Table 2: Section 1 responses regarding knowledge of participants about how they used the antibiotics**

Questionnaire Items	Response	N (%)
<b>indications of antibiotics</b>	Tonsillitis or tooth infection (bacterial infection)	596 (51.6)
	Headache	85 (7.4)
	Fever	126 (10.9)
	Flu/common cold	232 (20.1)
	Muscle pain	35 (3)
	Don't Know	80 (7)
<b>Know the exact dose of antibiotic you should take</b>	Yes	922 (79.9)
	No	232 (20.1)
<b>The source from which you know the dose</b>	Internal leaflet	552 (47.8)
	Pharmacist	311 (26.9)
	Previous experience	185 (16)
	Education level (background of medical knowledge)	106 (9.3)
<b>Know the correct duration of antibiotic use as prescribed</b>	Yes	452 (39.2)
	No	702 (60.8)
<b>If the infection recurs again after some</b>	Yes	848 (73.5)

<b>Questionnaire Items</b>	<b>Response</b>	<b>N (%)</b>
<b>Time, do you think it will be effective again?</b>	No	306 (26.5)
<b>Know about the storage condition of drugs as shown in the leaflet</b>	Yes	882 (76.4)
	No	272 (23.6)
<b>Do you know how the antibiotic can be ingested orally?</b>	Direct without a drink	150 (13)
	Ingested with water	871 (75.5)
	Ingested with coffee or tea	133 (11.5)
<b>Do you know if repeated use of antibiotics is dangerous or not?</b>	Yes	948 (82.15)
	No	206 (17.85)
<b>Do you know why the antibiotic may not produce a response?</b>	When it is not necessary to use it*	146 (12.6)
	Not taking the full course of antibiotic	200 (17.3)
	Self-medication*	357 (31)
	Administering it prior to meals	120 (10.4)
	Using it in cases of fever *	56 (4.8)
	Taking many drugs at the same time*	163 (14.2)
	Using an alternative (same antibiotic but different company)	112 (9.7)
<b>Do you know something about resistance to an antibiotic?</b>	Yes*	887 (76.9)
	No	267 (23.1)
<b>Based on your knowledge, what makes bacteria resist antibiotics?</b>	Using unsuitable antibiotic for the disease*	95 (8.23)
	Using improper dose	82 (7.12)
	Using antibiotic for improper duration*	213 (18.45)
	All previous causes	764 (66.2)
* Statement used in scoring respondents' knowledge.		

Data on participants' behavior and attitude toward antibiotic use are shown in Table 3. Results revealed overzealous use of antibiotics as it showed that 1063 (92%) of the respondents had used antibiotics in the past three months with only 70.1% were prescribed by a physician to treat the condition. Good adherence to

antibiotics was revealed by 81.5% took the exact doses as prescribed by the physician or pharmacist. Regarding the risk associated with antibiotics use, majority of respondents (92.1%) were aware of the side effects associated with taking antibiotics (Table 4).

**Table 3: Section 2 responses regarding participants practice toward the use of antibiotics**

<b>Questionnaire Items</b>	<b>Response</b>	<b>N (%)</b>
<b>Did you use antibiotics in the past 3 months?</b>	Yes	1063 (92)
	No	91 (8)
<b>How they get their antibiotic</b>	Prescribed by physician	809 (70.1)
	Buy from the pharmacy on the advice of someone other than a doctor	302 (26.2)
	Used old antibiotics	43 (3.7)
<b>Do you use the antibiotic as your physician recommends?</b>	Yes	836 (72.4)
	No	318 (27.6)
<b>Use of antibiotics to the correct duration</b>	Continue to take the antibiotic even if feeling better	646 (56)
	Stop taking the antibiotic when feeling better	508 (44)
<b>Take antibiotic with the exact doses as prescribed by the physician/pharmacist</b>	yes	940 (81.5)
	no	214 (18.5)
<b>If they miss one dose?</b>	Take it once they remember	818 (70.9)
	Take double dose	20 (1.7)
	Skip it	316 (27.4)
<b>Can you use antibiotics for viral infection?</b>	yes	633 (54.9)
	no	521 (45.1)
<b>After the use of antibiotics, what about the persistence of symptoms?</b>	Disappear	146 (12.7)
	Decrease	266 (23)
	Not disappear and visit a physician	742 (64.3)
<b>After the improvement of an infection, if symptoms recur again, what do you do?</b>	Visit pharmacist and take the same antibiotic	613 (53.1)
	Visit the physician to take his/her advice	122 (10.6)
	Increase the dose by myself	89 (7.7)
	Stop using the previous one and use a new antibiotic by myself	330 (28.6)
<b>Do you use antibiotics before meals?</b>	Yes	957 (82.9)
	No	197 (17.1)
<b>Do you follow the physician's recommendations?</b>	Yes follow physician's recommendations	390 (33.8)
	No, stop its use without taking physician's advice	228 (19.7)
	No, decrease the antibiotic dose without taking physician's advise	246 (21.4)
	Not using antibiotics regularly?	290 (25.1)

**Table 4: Section 3 positive response of participants about the risk associated with antibiotics use**

Danger mentioned	N (%)
Antibiotic side effect / Allergies	1063 (92.1)
The emergence of drug resistance	806 (70)
Overdose of antibiotics	654 (56.7)
Know there are dangers but don't know what they are	264 (22.8)

## DISCUSSION

Antibiotics remain the first therapeutic option to many communities worldwide [27]. Hence, it is essential to assure quality and safe drug use by regulating issues such as self-medication, which is an important determinant of improper use of antibiotics [28]. Previous study was conducted among pharmacy student to evaluate the practice of self-medication among pharmacy students in the University of Jordan, and the prevalence of self-medication among them was 86.7%, and antibiotics was one of the most commonly used drug. [29] The present study was the first to assess the current knowledge and practices in the consumption of antibiotics among young age group mainly at Yarmouk University. The general knowledge of antibiotic use and resistance is quite moderate; 72.7% of respondents reported correct responses with a mean score of 16 out of 22. On contrary, a previous pilot study conducted in Amman [20] showed that the knowledge of antibiotic use and resistance is inadequate in Jordan with <50% reported correct responses. Not surprisingly, as our study differs from the aforementioned work in sample size and the percentage of unawareness of respondents.

Surprisingly, high rates of antibiotic use were found. In fact, 92% of respondents (>18 years old) reported having used antibiotics in the past three months. Results of the present study are significant higher than a recent study in Jordan by Yusef et al., [30] who reported that 41% of the sample, have received oral antibiotics in the past two months, of which 38% acquired antibiotics without a prescription.

In addition, the majority (70%) stated that the

antibiotic was prescribed by the physician to treat the condition while one-quarter of individuals (29%) had followed the advice of someone other than the physician or had used an old prescription before taking the antibiotic. These findings were better than those reported in a survey in Kuwait [31] where only 43% were prescribed antibiotics by a physician to treat the condition, while 57% used an old prescription or took someone else's advice. This clearly indicates how much the laws that control the sale of antibiotics in pharmacies in the Jordan republic are followed comparing to Kuwait. Literature confirms that such practices could increase the development of resistant strains of microorganisms [32]. Similarly, some studies have shown that in developing countries, antimicrobials may be obtained without prescriptions from qualified medical personnel, even though the drug regulatory agencies in the countries designate these medicines as prescription-only [33]. In Iraq, testing the bacterial isolates from urine, blood, throat swab, sputum and purulent wounds samples collected from Baghdad hospitals which included the following species of bacteria: GAβHS, K. pneumoniae, S. aureus, Proteus spp and Ps. Aeruginosa revealed that the above bacteria have developed mostly a high degree of multi-drug resistance.[34] To control the emergence of multi-drug resistance to antimicrobials there is an urgent need to formulate a policy to reduce the inappropriate antibiotic use.

Antimicrobial agents are the most commonly used and misused among all drugs and the consequences of the wide spread use of antimicrobial drugs has increased the emergence of antibiotic resistant pathogens which necessitate the need for new drugs (16-21).

Regarding the indication of antibiotics, the study populations were less knowledgeable pertaining to the indication of antibiotics for the treatment of viral infections. The proportion of respondents who thought that antibiotics are effective for viral infections was comparable with a survey conducted in Britain, Europe, Denver, Wisconsin, and Minnesota (54-55%) [35-38], but better than proportions reported from New Jersey (70%) [39] and Malaysia (67%) [40]. The possible reason for the inadequacy of knowledge in this area could be due to the term “germ”, which was normally used during counseling or provision of medical advice to the public/patients instead of using the microbiological term “bacteria” or “virus”.

Interestingly, 92% of the participants said they were aware of the risk associated with antibiotic use. Among those aware of the risks, only 70% mentioned the emergence of drug resistance as a consequence as antibiotic use, while 23% said that they knew there were dangers in taking antibiotics but they did not know what they were. These results demonstrate an evident lack of knowledge and poor practice towards antibiotic consumption.

The most important issue regarding the resistant causes is the duration of the antibiotic course. Only about half of the respondents (56%) had correct knowledge of the need to complete the full course of antibiotics when symptoms of infection are improving. A similar proportion of respondents with correct knowledge were noted in the current study when compared with other studies done in Syria (50%) [7], Hong Kong (58%) [24], and Taiwan (50.1%) [23].

The present work revealed a lack of knowledge with the use of antibiotics in the northern part of Jordan as evidenced by the high percentages of those who know that antibiotics can be used when it is not necessary to use them, those who self-medicate themselves with antibiotics, those who ingest them in cases of fever without knowing its origin and if it is secondary to bacterial or viral infections, those who take many drugs concomitant with

antibiotics allowing for potential drug interactions, those who take an unsuitable antibiotic for the infective disease in addition to those who improperly use the antibiotics either using improper dose or using it for the improper duration. Other previous studies in Arabian countries are in the same line of bad knowledge of their population about antibiotic use. A study by Tshokey et al. (2017) found also unsatisfactory knowledge and practices toward antibiotic use [41]. On the same line, more than one-third of the Kuwait population did not complete the prescribed antibiotic course and some had self-medicated with antibiotics [42].

Overall, the assessment of knowledge on antibiotic consumption reveals several risk factors associated with irrational use of antibiotics; consumption of antibiotics for common cold and fever, lack of knowledge on the accurate dose and frequency, and poor compliance to antibiotic therapy, which is indirectly indicated by the lack of knowledge on the duration of the antibiotic course. Gualano and his colleagues mentioned that about one-third of the population in low and middle-income countries lack knowledge about antibiotics [43]. These factors are known to contribute to the irrational use of antibiotics and the development of resistance [27]. Interventions on enhancing awareness about antibiotics and resistance and introducing standard therapeutic guidelines should be conducted.

#### **LIMITATIONS OF THE STUDY**

Some limitations of this study are that only one university in Jordan was examined; a multi-institution study may reveal higher rates of student participation. In addition, the snapshot nature of the cross-sectional design restricts the generalizability of the study outcomes. Furthermore, some of questions' responses may be exposed to subjective variability and reported bias.

#### **CONCLUSION AND FUTURE PERSPECTIVE**

Despite that the knowledge of antibiotic use and resistance among Yarmouk University's students was quite good; they have a defect in following the instructions



regarding the proper doses and duration of treatment. Interventions to enhance their awareness about rational usage of antibiotics are highly recommended by promoting expert-driven behavioural change, education and training.

#### **Authors Contribution**

LMM had a major contribution in designing and coordinating the study, she conceived the research idea, participated statistical analysis, and interpretation of data, and drafted the manuscript. DA conceived the research idea and helped in editing the final version of the manuscript for publication. KMM participated in

statistical analysis and interpretation of data HAK and RT contributed to writing, revising, and editing the manuscript and designing figures. LAI and MAN are medical students at Yarmouk University in Jordan. They helped in the interpretation of data, drafting, and editing the final version.

#### **Conflicts of interest**

The authors declare no conflict of interest

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## **REFERENCES**

1. Shet A, Sundaresan S, Forsberg B. Pharmacy-based dispensing of antimicrobial agents without prescription in India: appropriateness and cost burden in the private sector. *Antimicrob Resist Infect Control* 2015; 4(1): 55.
2. Buke A.C., Ermertcan S., Hosgor-Limoncu M., Ciceklioglu M., Eren S. Rational antibiotic use and academic staff. *Int J Antimicrob Agents* 2003; 21(1):63–66.
3. Abood EA, Wazaify M. Abuse and Misuse of Prescription and Nonprescription Drugs from Community Pharmacies in Aden City-Yemen. *Subst Use Misuse* 2016; 51(7):942-7 .
4. Albsoul-Younes A, Wazaify M, Yousef A, Tahaine L . Abuse and misuse of prescription and nonprescription drugs sold in community pharmacies in Jordan. *Med Misuse* 2010; 45(9):1319-1329.
5. McManus P, Hammond ML, Whicker SD, Primrose JG, Mant A, Fairall SR. Antibiotic use in the Australian community, 1990-1995. *Med J Aust* 1997; 167(3):124-127.
6. Metlay JP, Stafford RS, Singer DE. National trends in the use of antibiotics by primary care physicians for adult patients with cough. *Arch Intern Med* 1998; 158(16):1813-1818.
7. Barah F, Gonçalves V. Antibiotic use and knowledge in the community in kalamoon, syrian arab republic: A cross-sectional study. *East Mediterr health j* 2010; 16(5):516-521.
8. Gyssens IC. Quality measures of antimicrobial drug use. *Int J Antimicrob Agents* 2001; 17(1):9-19.
9. Sawair FA, Shayyab MH, Al-Rabab'ah MA, Saku T. Prevalence and clinical characteristics of tori and jaw exostoses in a teaching hospital in Jordan. *Saudi Med J* 2009; 30 (12):1557-1562.
10. Al-Bakri AG, Bustanji Y, Yousef A. Community consumption of antibacterial drugs within the Jordanian population: Sources, patterns and appropriateness. *Int J Antimicrob Agents* 2005; 26(5):389-395.
11. Al-Azzam SI, Al-Husein BA, Alzoubi F, Masadeh MM, Al-Horani "AS. Self-medication with antibiotics in jordanian population. *Int J Occup Med Environ Health* 2007; 20(4):373-380 .
12. Al-Momany N, Al-Bakri A, Makahleh Z, Wazaify M Adherence to international antimicrobial prophylaxis guidelines in cardiac surgery: A jordanian study demonstrates need for quality improvement. *J Manag Care Pharm* 2009; 15(3):262-271.
13. Dar-Odeh N, Abu-Hammad O, Al-Omiri M, Khraisat A, Shehabi A Antibiotic prescribing practices by dentists: A review. *Ther Clin Risk Manage* 2010, 6:301-306.
14. Jarab AS, Mukattash TL, Nusairat B, Shawaqfeh M, Farha RA. Patterns of antibiotic use and administration in hospitalized patients in Jordan. *Saudi Pharm J.* 2018; 26(6):764-770.
15. Sajal K Saha, Lesley Hawes, Danielle Mazza. Improving antibiotic prescribing by general practitioners: a protocol for a systematic review of interventions involving pharmacists. *Br Med J Open* 2018; 8(4): e020583.
16. Budwall B. The role of pharmacists in training doctors

- about infections and antimicrobial prescribing. *J Infect Prev* 2010; 11(4):114–8.
17. Yousef AM, Al-Bakri AG, Bustanji Y, Wazaify M. Self-Medication Patterns in Amman, Jordan. *Pharm World Sci* 2008; 30(1):24-30.
  18. Aslam B, Wang W, Arshad MI, Khurshid M, Muzammil S, Rasool MH, Nisar MA, Alvi RF, Aslam MA, Qamar MU, Salamat MK, and Baloch Z. Antibiotic resistance: a rundown of a global crisis. *Infect Drug Resist* 2018; 11: 1645–1658.
  19. Lee CR, Cho IH, Jeong BC, Lee SH. Strategies to minimize antibiotic resistance. *Int J Environ Res Public Health* 2013; 10(9):4274-305
  20. Shehadeh M, Suaifan G, Darwish RM, Wazaify M, Zaru L, Alja'fari S . Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study. *SAUDI PHARM J* 2012; 20(2):125-133.
  21. Jairoun, A., Hassan, N., Ali, A, Jairoun, O., Shahwan, M., Hassali, M. University students' knowledge, attitudes, and practice regarding antibiotic use and associated factors: a cross-sectional study in the United Arab Emirates. *International Journal of General Medicine*. 2019;12 235–246.
  22. Buke C., Hosgor-Limoncu M., Ermertcan S., Ciceklioglu M., Tuncel M., Köse T., Eren S. Irrational use of antibiotics among university students. *J Infect* 2005 ;51(2):135–139 .
  23. Chen C, Chen Y, Hwang K, et al . Behavior, attitudes and knowledge about antibiotic usage among residents of changhua, taiwan. *J Microbiol Immunol Infect* 2005; 38(1):53-59.
  24. You JHS, Yau B, Choi KC, Chau CTS, Huang QR, Lee SS . Public knowledge, attitudes and behavior on antibiotic use: A telephone survey in hong kong. *Infection* 2008; 36(2):153-157.
  25. Otten JJ, Cheng K, Drewnowski A. Infographics and public policy: Using data visualization to convey complex information. *Health Aff* 2015; 34(11):1901-1907
  26. Bresciani S, Eppler MJ. The pitfalls of visual representations: A review and classification of common errors made while designing and interpreting visualizations. *SAGE Open* 2015; 5(4):215824401561145.
  27. Santo E, Floury B, Cisse M. What determines the choice of health care treatment in the town of contonou (benin)? *Bull World Health Organ* 1998; 76(2):195-201.
  28. Holloway K, Dijk LV. World medicine situation 2011: rational use of medicine. Geneva: World Health Organization 2011; 3 (1).
  29. Alsous, M., Elayeh, E., Jalil, M. A., Alhawmdeh, E. Evaluation of Self-Medication Practice among Pharmacy Students in Jordan. *Jordan J Pharm Sci*, (2018); 11(1).
  30. Yusef D., Babaab A, Bashaireh A, Al-Bawayehb H, Al-Rijja K, Nedal M, Kailani S Knowledge, practices & attitude toward antibiotics use and bacterial resistance in Jordan: A cross-sectional study. *Infect Dis Health* 2018; 23(1): 33-40.
  31. Abdelmoneim Ismail Awad, and Esraa Abdulwahid Aboud Knowledge, Attitude and Practice towards Antibiotic Use among the Public in Kuwait *PLoS One*. 2015; 10(2): e0117910 .
  32. Seppälä H, Klaukka T, Vuopio-Varkila J, et al. The effect of changes in the consumption of macrolide antibiotics on erythromycin resistance in group a streptococci in finland. *N Engl J Med* 1997; 337(7):441-446.
  33. Mahmoud, I. S., Altaif, K. I., Abu Sini, M. K., Daoud, S., & Aqel, N. N. (2020). Determination of Antimicrobial Drug Resistance among Bacterial Isolates in Two Hospitals of Baghdad. *Jordan J Pharm Sci*, 2020; 13(1).
  34. Hart CA, Kariuki S. Antimicrobial resistance in developing countries. *Br Med J* 1998; 317(7159):647-650.
  35. Wilson AA, Crane LA, Barrett Jr PH, Gonzales R . Public beliefs and use of antibiotics for acute respiratory illness. *J Gen Intern Med* 1999; 14(11):658-662.
  36. Belongia EA, Naimi TS, Gale CM, Besser RE. Antibiotic use and upper respiratory infections: A survey of knowledge, attitudes, and experience in wisconsin and minnesota. *Prev Med* 2002; 34(3):346-352.
  37. McNulty CAM, Boyle P, Nichols T, Clappison P, Davey P. Don't wear me out-the public's knowledge of and attitudes to antibiotic use. *J Antimicrob Chemother* 2007; 59(4):727-738.
  38. Grigoryan L, Burgerhof JGM, Degener JE, et al.

- Attitudes, beliefs and knowledge concerning antibiotic use and self-medication: A comparative european study. *Pharmacoepidemiol Drug Saf* 2007; 16(11):1234-1243.
39. Filippetto FA, Modi DS, Weiss LB, Ciervo CA. Patient knowledge and perception of upper respiratory infections, antibiotic indications and resistance. *Patient Prefer Adherence* 2008; 2:35-39.
40. Oh AL, Hassali MA, Al-Haddad MS, Sulaiman SAS, Shafie AA, Awaisu A. Public knowledge and attitudes towards antibiotic usage: A cross-sectional study among the general public in the state of penang, malaysia. *J Infect Dev Countr* 2011; 5(5):338-347.
41. Tshokey, T., Adhikari. D., Tshering, T., Wangmo, S., Wangdi, K. Assessing the knowledge, attitudes, and practices on antibiotics among the general public attending the outpatient pharmacy units of hospitals in Bhutan: a cross-sectional survey. *Asia Pac J Public Health* 2017; 29(7):580–8.
42. Awad, A.I., Aboud, E.A. Knowledge, attitude and practice towards antibiotic use among the public in Kuwait. *PLoS One*. 2015; 10(2):e0117910.
43. Gualano, M.R., Gili, R., Scaioli, G., Bert, F., Siliquini, R. General population's knowledge and attitudes about antibiotics: a systematic review and meta-analysis. *Pharmacoepidemiol Drug Saf*. 2015; 24(1):2–10.

## المعرفة والمواقف والممارسة تجاه استخدام المضادات الحيوية بين طلاب البكالوريوس والدراسات العليا في جامعة اليرموك في الأردن: دراسة وصفية

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### ملخص

**الهدف:** زاد الاستخدام غير العقلاني والمفرط للمضادات الحيوية بالإضافة إلى مقاومة الأدوية المتعددة في حدود تنذر بالخطر في جميع أنحاء العالم. هدفت هذه الدراسة إلى تقييم المعرفة والممارسات تجاه استخدام المضادات الحيوية لدى طلاب جامعة اليرموك

**المنهج البحثي:** تم توزيع استبانة للمسح المقطعي باستخدام نسخة إلكترونية منظمة من استبيان صالح على المشاركين. تم إعداد نموذج بناءً على الاستبيان المتاح على google form، والذي تمت مراجعته من قبل مجموعة من الصيادلة الأكاديمية للتحقق من صحة الاستبيان. تم إجراء اختبار test-retest وتم حساب Cronbach alpha. تم توزيع الاستبانة بشكل عشوائي على طلاب البكالوريوس والدراسات العليا في جامعة اليرموك عبر البريد الإلكتروني.

**النتائج:** تم تحليل ما مجموعه 1154 فرداً ممن أكملوا الاستبيانات. كانت المعرفة باستخدام المضادات الحيوية ومقاومتها جيدة جداً؛ حيث بلغت 72.7% عن استجابات صحيحة بمتوسط درجة 16 من 22. وقد كانت نسبة استخدام المضادات الحيوية عالية حيث أنه 92% من المستجيبين استخدموا المضادات الحيوية في الأشهر الثلاثة الماضية. كانت الممارسة الخاطئة تجاه المضادات الحيوية شائعة؛ حيث تم استخدامه 48% لدواعي غير صحيحة (على سبيل المثال، نزلات البرد والحمى والألم)، واستخدم 60% لمدة غير مناسبة و 20% لم يأخذوا الجرعات الصحيحة.

**الاستنتاجات:** توصى هذه الدراسة بشدة باتخاذ الإجراءات اللازمة لتعزيز الوعي والفهم للاستخدام الرشيد لمضادات الميكروبات من خلال تعزيز التغيير السلوكي بالاستعانة بالخبراء والتواصل الفعال والتعليم والتدريب. علاوة على ذلك، يجب إدخال قيود قانونية على صرف المضادات الحيوية. من غير وصفة طبية.

**الكلمات الدالة:** مضاد حيوي، موقف سلوك، وعي، الأردن، استخدام عقلائي.

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