Knowledge and attitude among samples from community members, pharmacists and health care providers about antibiotic resistance in Al-Suwaria city/ Wasit province/Iraq

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Abstract

Antimicrobial resistance (AMR) is one of the greatest public health challenges of our time, primarily due to inappropriate antimicrobial use. Addressing this threat is a public health priority that requires a collaborative global approach in all areas. The rational use of antimicrobials is the main strategy for the prevention of antimicrobial resistance, which can be achieved by changing the behavior and knowledge of the prescribers. So, for the success of any problem management program, the most important prerequisite is community participation. Therefore, this study aimed to assess the knowledge and attitude of the samples of community members, pharmacists and health professionals in the city of Al-Suwaria, in the province of Wasit, in the Middle East of Iraq, with respect to antimicrobial resistance, which helps to rationalize the use of antimicrobials. In this survey, a cross-sectional study of 102 random contributing samples was performed. From January to March 2020. Knowledge and attitudes were assessed using a typical self-administered questionnaire. Descriptive analyzes were used to express the results. A total of 102 participants answered the questionnaire. Overall, collaborators have established good knowledge and positive attitudes toward antimicrobial resistance based on 13 knowledge questions and nine attitude statements. Gaps were identified in the knowledge of the possibility of addressing resistance through the discovery of a new drug (21.6%), the possibility of using antibiotics as an effective drug against viral diseases (36.3%) and the possibility of accelerate the treatment of diseases with antibiotics (38.2%). The majority of respondents (72.5%) agreed that antibiotic resistance induces serious global problems that affect public health. Furthermore, the majority of those interviewed (69.6%) believe that this phenomenon affects our health and that of our families. Similarly, (13.7%) of the participants totally agreed, while (65.7%) agreed that pharmacists played an important role in the appearance of this problem, and (37, 3%) of the participants fully agreed, while (58.8%) agreed that it is necessary to follow the recommendations and guidelines for life-saving antibiotics in the hospital. In contrast, 27.5% of the participants expressed a weak attitude towards the possibility of fighting antimicrobial resistance in their region through infection control practices by health professionals. Contributors in this study had good knowledge and positive attitudes toward antimicrobial resistance. Although the data is indicative of gaps in the knowledge of residents of the city of Al-Suwaria / Wasit province.
Keywords: Antibiotic resistance, Al-Suwaria city, community members, pharmacists, health care providers

1. Introduction

Today, antimicrobial resistance (AMR) is a complex global public health challenge, particularly in developing countries (Seid & Hussen, 2018). Increased antimicrobial resistance can jeopardize the therapeutic efficacy of antibiotics, increase treatment failure, and consequently lead to longer and more serious illness with higher costs and death rates. Antimicrobial resistance alone has been approximated to cause around ten million deaths worldwide (de Kraker et al., 2016). Antibiotic abuse and misuse induce selective pressure, resulting in the development of resistance traits in bacterial populations, which can adversely affect health, veterinary, and agricultural care worldwide (AL-Shammary & Kanaan, 2013; Kanaan, 2018; Kanaan & Abdullah, 2019; Kanaan & Abdulwahid, 2019; Kanaan & Mohammed, 2020; Kanaan et al., 2020). Globally, the inappropriate use of antibiotics is estimated to be 50%. According to the Centers for Disease Control and Prevention (CDC), 80% of the total amount of antibiotics used in the United States has been paid to the Manufacturing sector. animals, non-medical treatment and currently, two million people suffer infections with resistant bacteria and 23,000 die each year (Kanaan & Al-Isawi, 2019). According to a CDC report from September 2013, treating antibiotic-resistant infections adds $35 billion to healthcare costs and 8 million hospital days per year in the United States (Dantas & Sommer, 2014). The main contributing factors to the antimicrobial resistance crisis in developing countries are a high burden of infectious diseases, irrational use of antibiotics, a poor infection control policy, poor medications, limited knowledge about antimicrobial resistance, misdiagnosis and lack of laboratories for antibiotic sensitivity tests (García et al., 2011). Although, many strategies for antibiotic use have been proposed, such as formal replacement or limitation, healthcare provider training, feedback activities, infectious disease specialist approval requirements for prescription drugs, and more rational use of antibiotics. antimicrobial agents worldwide (Ahmad et al., 2012). But the rational use of antimicrobials is the main strategy to prevent antimicrobial resistance. The role of pharmacists/pharmacies in restricting antimicrobial resistance is highlighted in many reports (Waseem et al., 2019). In addition, other factors include prescriber knowledge and experience, diagnostic uncertainty, patient perceptions of prescriber interaction, irrational prescriptions, availability of over-the-counter (OTC) antibiotics, and insufficient patient education for doctors (Anong & Akoachere, 2018), making the problem trilateral, involving the consumer/patient, the pharmacist/pharmacy owner and the doctor. Therefore, monitoring antibiotic use requires multi-faceted interventions that involve the competent public, motivated community pharmacists, and the health professionals involved. The World Health Assembly approved a
comprehensive action plan on antimicrobial resistance in May 2015. Public awareness and better understanding of antimicrobial resistance are the key strategic objectives of this global plan on resistance to antimicrobials.

Reports from the World Health Organization (WHO) have suggested educational and monitoring interventions aimed at rationalizing the prescription, elimination and consumption of antibiotics to curb antimicrobial resistance (Awad & Aboud, 2015). In Iraq, the OTC availability of most antibiotics and the irresponsible use of antibiotics by patients makes the problem a threefold issue involving patients, pharmacists and doctors. And due to the lack of data on the knowledge and attitude of patients, doctors and pharmacists towards antimicrobial resistance in Iraq. Therefore, the current study was designed to assess knowledge and attitude among the three main stakeholders in the city of Al-Suwaria in order to develop control programs that help combat this phenomenon in Iraq, particularly among patients in the city of Al-Suwaria in the Wasit governorate.

2. Methodology

Study design, site and respondents

A descriptive, cross sectional study was conducted at January to March 2020, among samples of community members, pharmacists and health care providers about antibiotic resistance in Al-Suwaria city. These samples include different experiences ranging from no formal education to Masters.

The data were collected by a research students' and they were also responsible for providing explanation to the contributors, in case of any request by a self-administered questionnaire which was distributed to suitable contributors for their responses. The questionnaire was tested before. After comprehensively reviewing for content validity, the initial draft was sent to three experts for their opinion on the relativity, simplicity and the importance of the content.

It was divided in four sections. First section investigated the demographic information of contributors like age, gender, qualification, occupation status, marital status and residence. Second section included 13 questions which evaluated the knowledge of those tasters in Al-Suwaria city about resistance to antimicrobials. Questions on knowledge were used to assess general knowledge of contributors towards resistance to antimicrobials and its components. It assessed information like uses of antibiotics, how to get them, causes of resistance, efficacy of them and the danger of antibiotic resistance to public health. The attitudes were evaluated in the third section based on nine statements. In the last section the information sources of contributors about resistance to antimicrobials were explored.
Data analysis

The responses of contributors were analyzed by using SPSS v.20. Descriptive analysis was used to express the demographic information in frequencies and percentages. The knowledge questions consisted of Yes and No response categories. The responses of contributors over attitudes statement were measured on four points of agreement consisted of agree, disagree, strongly agree and strongly disagree.

Results:

Demographic information of the respondents

A total of 102 participants responded to the questionnaire. Vast majority of contributors were aged < 30 years (n = 78, 76.5%), while lowest contributors were aged > 45 (n= 7, 6.9%). In addition, female had the highest contribution (n= 59, 57.8%), while male had the lowest (43, 42.2%). With regard to educations, the majority of contributors had Diploma degree (n = 45, 44.1%), while lowest of contributors had no formal education as (n = 2, 1.9%). But when take into consideration occupational status, government employee (n = 52, 50.9%) were the major contributors in this study. The number of married contributors (n = 57, 55.9%) were lower than the single contributors (n = 45, 44.1%). The numbers of contributors from rural areas (n = 17, 16.7%) and urban areas were (n = 85, 83.3%) (Table 1).

Knowledge of respondents about resistance to antimicrobials

The knowledge of respondents about resistance to antimicrobials (based on 13 knowledge questions). Overall, 100 % (n = 102) contributors exhibited good knowledge of antimicrobial resistance. Vast majority of the contributors in the current study were correctly answered with the statement that bacterial infections can be cured with antibiotics (n= 87, 85.3%), and knew about the resistance to antimicrobials (n= 86, 84.3%). Contributors were highly knowledgeable about the consequences of improper and unfair usage of antibiotics (n = 82, 80.4%). High proportion of the contributors knew about the cause of emergence of bacterial resistance (n= 68, 66.7%). On the contrary, contributors were least knowledgeable on the possibility of facing resistance by discovering a new drug (n = 80, 78.4%). Similarly, (n = 65, 63.7%) contributors incorrectly answered about the possibility of using antibiotics as an effective drug against viral diseases. Moreover, high proportion of contributors (n = 61, 59.8 %) incorrectly responded on the effect of antibiotic novelty and its price on its effectiveness against infections. The description of knowledge of contributors about antimicrobial resistance is summarized in (Table 2).

Attitudes of respondents about resistance to antimicrobials.

The attitude of contributors towards resistance to antimicrobials (based on nine attitude statements). Overall, vast majority of the contributors showed positive attitudes regarding resistance. A large proportion of respondents (n = 74, 72.5%) were agreed that antibiotic
resistance induce serious global problem affecting public health. Majority of respondents believed that this phenomenon affects our health and that of our families (n = 71, 69.6%). Similarly, (n = 14, 13.7%) of contributors strongly agreed while (n = 67, 65.7%) agreed that pharmacists have a noticeable role in the emergence of this problem, and (n= 38 ,37.3%) of contributors strongly agreed, while (n= 60, 58.8%) agreed that there is a necessity to follow the recommendations and guidelines for life saving antibiotics in the hospital. On the other hand, (n = 43, 42.2%) of contributors were strongly agreed, while (n=45, 44.1%) agreed on the necessity to further control over-the counter antibiotic dispensing.

Low percentage of contributors (n = 31, 30.4%) strongly agreed that socioeconomic status of people can affects the risk of antibiotic resistance, while (n = 6 ,5.9%) strongly disagreed that. However, 16.7% (n = 17) of contributors strongly disagreed that doctors are the only persons who know the meaning of antibiotic resistance. Contrary, 19.6% (n = 20) contributors strongly agreed that. Furthermore, 27.5% ( n= 28) of the contributors expressed weak attitude towards possibility to combat antimicrobial resistance in their region through strong infection control practices by health care professionals. The description of attitudes of the participants about black fever is presented in (Table 3).

Information sources of respondents about antimicrobial resistance.

Our results showed that all sources (n=63, 61.8%), internet (n = 25, 24.5%) and university (n = 9, 8.8%) were the main bases used by contributors to educate themselves about antimicrobial resistance. In addition the other sources which includes; TV, books and newspapers take about (n=5 , 4.9%) (Fig. 1).

3.Discussion

Antimicrobial resistance (AMR) has been reported to be a global health challenge which requires multi-sectoral contributions and approaches to curbing (WHO, 2018). The World Health Organization (WHO) developed the Global Action Plan to help fight against antimicrobial resistance (WHO, 2018). The uniqueness of this study is that it is one of the few efforts to assess knowledge and attitude of samples from community members, pharmacists and health care providers about AMR. Nevertheless, it is significant to remark that the outcomes of this study have limitations, this study was conducted in in Al- Suwaria city at Wasit governorate, the findings may not be generalized to other areas. Additionally, majority of contributors had Diploma degree and from urban area, so it is useful to review a large sample size in different zones in order to clarify this issue. Despite the limitations identified, our findings have important consequences for the prevention of AMR through rational use of antimicrobials. The outcomes of this study could have important to combat AMR by changing the prescribers’ behavior and knowledge via education and delivery of data to the people to
increase their knowledge and attitudes towards control of AMR to improve the public health against this phenomenon.

The result of our study showed that most of the respondents (85.3%) correctly answered with the statement that bacterial infections can be cured with antibiotics, as well as most of them were knowledgeable on the resistance to antimicrobials (84.3%). Likewise, Jairoun et al. (2019) in their study in the United Arab Emirates reported that 91.4% of contributors have considered antibiotics as ideal cure for bacterial infections. As well as, (76.2%) of contributors at the same study were knew about bacterial resistance which is closely comparable with existing study.

Our result also revealed that high proportion of contributors were highly knowledgeable about the consequences of improper and unfair usage of antibiotics (80.4%), which is very satisfactory as compared to other results obtained by Ayepola et al. (2019) in Nigeria, and Mudenda et al. (2019) in Zambia as (75% and 76%), respectively. On the other hand, our results was higher than the results of Seid & Hussen (2018) in Ethiopia (56%). The variability between studies might be due to that vast majority of contributors (73.5%) in our studies were only pharmacists and health care providers. This might be the possible reason for the disagreement. This proposes that contributors had an encouraging score on knowledge questions embedded in basic science as well as their expertise due to practical exposure.

Our results displayed that 66.7% of contributors were provide correct answers about the cause of emergence of bacterial resistance. This result is closely comparable to than that found by other researchers in Ethiopia and in Zambia (Erku, 2016; Seid & Hussen, 2018; Mudenda et al., 2019), were more than 60 % of contributors well informed about the cause of antimicrobial resistance and the consequences of inappropriate utilization of antibiotics. Inappropriate use of antibiotics is well known to be one of the leading factors that cause antibiotic resistance (WHO, 2018). Thus, pharmacists and health care providers need to recommend the rational use of antibiotics.

In our study, the majority of contributors (78.4%) disagreed that the discovery of new antibiotics can help solve antibiotic resistance challenges. These results were closely similar to the findings of Tegagn et al. (2017), though with a relatively higher percentage of 69% compared to 78.4% in this study. Discovery of alternative antibiotics is a key in reducing antibiotic resistance but it is not the only alternative to fighting antibiotic resistance. If new antibiotics were to be discovered, other practices such as irrational dispensing, prescribing, regulation and consumption of antibiotics need to be improved. The majority of contributors (73.5%) agreed that the misuse of antibiotics leads to antibiotic resistance. Many other studies have shown that misuse of antibiotics may lead to antibiotic resistance (Roque et al., 2015; Erku, 2016; Kalungia et al., 2016).
An alarming finding was the one related to the possibility of using antibiotics as an effective drug against viral diseases, our results revealed that 63.7% of contributors were least knowledgeable about that, which is closely comparable to the results obtained by Seid & Hussen (2018), in Ethiopia who reported that 65% of the contributors in their study incorrectly answered on the possibility of using antibiotics as an effective drug against common cold and flu. On the other hand, our result was higher than that found in UAE (48%), and Nigeria (35.7%) (Jairoun et al., 2019; Ayepola et al., 2019). Our results were lower than that obtained in Pakistan where only 24.7% correctly disagreed with the statements that antibiotics are an effective therapy against viruses.

The results of this study showed that people’s knowledge about the effect of antibiotic novelty and its price on its effectiveness against infections is low by which only 40.2% of contributors were correctly responded to this question, this is lower than that obtained by Jairoun et al. (2019), in UAE who reported that 69.4% of contributors in their study were correctly answered on the same question. This shows confusion exists among the general community regarding the accuracy knowledge of the effectiveness of antibiotics which may have serious implications due to unauthorized access by antibiotics for the public due to lack of regulation pharmacies and drugstores. With the exception of the consumer and pharmacists, pharmacy owners also play an important role in guarantee wide dissemination of knowledge on this subject and on the correct use and disposal of medications. According to our knowledge, the qualified pharmacist was not present in some pharmacies. Sometimes, pharmacy owners and unskilled staff handle prescriptions for doctors. The absence by a licensed and qualified pharmacist in the pharmacy also denies the WHO guidelines (Anderson, 2002). Antimicrobial resistance centralized management interventions can improve in the same way knowledge of community members about this global threat. Such management programs have already successfully chosen in developed countries like USA, China, Canada and some European countries (Doron & Davidson, 2011; Xiao, 2018). In addition, national and provincial antibiotic acts must be implemented in a real spirit to stop pharmacy operations without a qualified pharmacist (Waseem et al., 2019).

Overall, The results exhibited that majority of the contributors showed positive attitudes regarding resistance. A large proportion of respondents (72.5%) were agreed that antibiotic resistance induce serious global problem affecting public health, whereas only 8.8% of the respondents strongly agreed that this phenomenon could be induce serious public health problem globally. This result was in accordance with the study performed in Ethiopia (Seid & Hussen, 2018), who reported that more than 70% of the participants believed that antimicrobial resistance is a major problem in the universe as comfortably as in Ethiopia. On the other hand, This result was conflicting with the results obtained in Zambia (Mudenda et al., 2019), and in Ethiopia (Tegagn et al., 2017) who reported that (72%) and (44.9%) of the
respondents were strongly agreed about the same statement, respectively. This might be due to the fact that in our study not all respondents were pharmacists or health care professionals as well as approximately one quarter of our samples were non-professionals which indicates that this segment of the contributors had no scientific base or practical experience on this topic. Other studies also reported AMR as a public health problem (Cotta et al., 2014; Brink et al., 2016; Mansour & Al-Kayali, 2017). A global challenge requires all countries to work together in fighting the problem.

Additionally, majority of respondents believed that this phenomenon affects our health and that of our families (69.6%), this finding is in line with the results presented by the study in UAE (Jairoun et al., 2019), by which 68.7% of respondents were agreed about the same statement. On the other hand, our result is lower than that reported in Ethiopia (Seid & Hussen, 2018), by which 90.7% of respondents were agreed about that.

Our study further presented that 13.7% of contributors strongly agreed while 65.7% agreed that pharmacists have a noticeable role in the emergence of this problem. These findings are contradictory with what was found by other researchers (Broom et al., 2015; Khan et al., 2016; Brink et al., 2016; Mudenda et al., 2019) in which the majority of contributors strongly agreed and about the role of pharmacists in the emergence of antibiotics resistance.

The International Pharmaceuticals Federation (FIP) and WHO has also recommended prominent roles which pharmacists must play to curb antibiotic resistance.

Furthermore, our results indicated that 37.3% of contributors were strongly agreed, while 58.8% agreed that there is a necessity to follow the recommendations and guidelines for life saving antibiotics in the hospital. On the other hand, 42.2% of contributors were strongly agreed, while 44.1% agreed on the necessity to further control over-the counter antibiotic dispensing. These findings are in line with the results of Seid & Hussen (2018), in which 72.1% and 84.2% of the contributors were agreed about the necessity to follow the recommendations and guidelines for life saving antibiotics in the hospital and about further control over-the counter antibiotic dispensing, respectively. It was advancing as compared to another similar study, in which 65% of the participants thought that antibiotics should never be purchased as over the counter drugs (Sadasivam et al., 2016).

Low percentage of contributors (30.4%) were strongly agreed that socioeconomic status of people can affects the risk of antibiotic resistance, while (5.9%) strongly disagreed that. Which incompatible with Ethiopian results in which (77.1%) of contributors were agreed while 13.9% disagreed about that (Seid & Hussen, 2018).

However, our results revealed that 16.7% of contributors strongly disagreed that doctors are the only persons who know the meaning of antibiotic resistance. Contrary, 19.6% contributors strongly agreed that. These findings are conflicting with the results obtained by
Mudenda et al. (2019) in Zambia, and Rehman et al. (2018) in Pakistan, they reported that majority of respondents up to 82% strongly disagreed with the notion that physicians are the only healthcare professionals who must understand AMR.

In our study, 27.5% of the contributors expressed weak attitude towards possibility to combat antimicrobial resistance in their region through strong infection control practices by health care professionals. This finding is higher than the result obtained by Seid and Hussen, (2018) in Ethiopia, they reported that 4.6% of the contributors expressed weak attitude towards the same issue. This might be linked to that in Ethiopian study all the contributors were final year undergraduate paramedical students which had a lot of information about this issue through the basic courses that are taken in their academic study. Therefore, this shows that antibiotic resistance should be understood and prevented by all healthcare professionals and other sectors other than the healthcare sector.

Our results (Fig.1) exhibited that all sources (61.8%), internet (24.5%) and university (8.8%) were the main bases used by contributors to educate themselves about antimicrobial resistance. Whereas, other sources which includes; TV, books and newspapers take about (4.9%).

A variety of resources were reported by the contributors to learn themselves about antimicrobial resistance. A study conducted in Ethiopia (Seid & Hussen, 2018), reported that the academic courses represented a main source of information for three-fourths of their contributors. Since all fields included in that study had pharmacology course in their syllabus. Therefore, this involves that giving additional emphasis regarding antimicrobial resistance, during delivering the course, might be a good opportunity to flourish the students’ knowledge and attitude about that issue. The discrepancy with our results might be due to the fact that more than 25% of our samples were non-professionals which indicates that this segment of the contributors had no scientific base or practical experience to flourish their knowledge and attitude about that topic.

The findings of this study could have significant implications for the development of future strategies for AMR education and provision of information to the people in rural and urban areas in general, to improve their knowledge and attitudes towards AMR. Additionally, this study highlights the need for further research in areas to decrease the gap in implementation of their knowledge via continuous behavioral change communication and social utilization related activities.

4. Conclusion

Our results established that majority of contributors shown good knowledge and positive attitudes towards the consequences of improper and unfair usage of antibiotics and about the cause of emergence of bacterial resistance. As well as, vast majority of the
contributors showed positive attitudes regarding bacterial resistance. However, there is still some improvement in certain areas of bacterial resistance on the possibility of facing resistance by discovering a new drug, and about using antibiotics as an effective drug against viral diseases, these findings may not be generalizable to other settings; hence, additional studies need to be conducted to validate the findings of this study. It is highly recommended to develop and implement antimicrobial surveillance programmes at the hospitals and all health care facilities to flourish the community contributors, pharmacists, and health care providers attitudes to rationalize the use of antimicrobial. So, resistance to antibiotics can be restricted. On the other hand, pharmacists and other healthcare workers need to be updated on antimicrobial resistance.

**Conflict of Interest**

The researchers pronounce they do not have any conflict of interest.

5. References

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Table (1): Demographic information of the participants.

| Demographic information     | Number | (%)  |
|-----------------------------|--------|------|
| **Age Groups**              |        |      |
| < 30                        | 78     | 76.5 |
| (31 – 45)                   | 17     | 16.7 |
| > 45                        | 7      | 6.9  |
| Total                       | 102    | 100  |
| **Gender**                  |        |      |
| Male                        | 43     | 42.2 |
| Female                      | 59     | 57.8 |
| Total                       | 102    | 100  |
| **Qualifications**          |        |      |
| No formal education         | 2      | 1.9  |
| Primary school              | 9      | 8.8  |
| Secondary school            | 16     | 15.7 |
| Diploma                     | 45     | 44.1 |
| Bachelor’s                  | 27     | 26.5 |
| Masters                     | 3      | 2.9  |
| Total                       | 102    | 100  |
| **Occupation Status**       |        |      |
| Farmer                      | 3      | 2.9  |
| Government employee         | 52     | 50.9 |
| Daily Wage Laborer          | 12     | 11.8 |
| Student                     | 32     | 31.4 |
| House wife                  | 3      | 2.9  |
| Others                      | 0      | 0    |
| Total                       | 102    | 100  |
| **Marital Status**          |        |      |
| Married                     | 45     | 44.1 |
| Unmarried                   | 57     | 55.9 |
| Total                       | 102    | 100  |
| **Residence**               |        |      |
| Rural                       | 17     | 16.7 |
| Urban                       | 85     | 83.3 |
| Total                       | 102    | 100  |

Table (2): Knowledge of participants towards resistance to antimicrobials.
| Questions (correct response) | Correct answer (%) | Incorrect answer (%) |
|-----------------------------|--------------------|----------------------|
| Can antibiotics be used to treat bacterial infections? (Yes) | 87 (85.3) | 15 (14.7) |
| Antibiotics can be used to treat infections caused by viruses? (No) | 37 (36.3) | 65 (63.7) |
| Do you think that the use of antibiotics will speed up healing of diseases? (No) | 39 (38.2) | 63 (61.8) |
| Antibiotics can be obtained without a doctor’s prescription in drug stores or pharmacies? (No) | 46 (45.1) | 56 (54.9) |
| Have you heard about bacterial resistance? (Yes) | 86 (84.3) | 16 (15.7) |
| Antibiotic resistance is caused by improper and unfair use of antibiotics? (Yes) | 82 (80.4) | 20 (19.6) |
| Misuse of antibiotics makes pathogens less sensitive? (Yes) | 75 (73.5) | 27 (26.5) |
| Antibiotic resistance may be caused by lower doses of antibiotics? (Yes) | 68 (66.7) | 34 (33.3) |
| Antibiotic resistance can be countered by the discovery of new antibiotics? (No) | 22 (21.6) | 80 (78.4) |
| Do you think antibiotic efficacy would be better if antibiotics were newly detected and higher priced? (No) | 41 (40.2) | 61 (59.8) |
| It is difficult to treat infections caused by resistant bacteria? (Yes) | 58 (56.9) | 44 (43.1) |
| Resistance bacteria may spread from person to person? (Yes) | 71 (69.6) | 31 (30.4) |
| Many infections caused by bacteria resist antibiotics? (Yes) | 78 (76.5) | 24 (23.5) |
Table (3): Attitudes of participants towards resistance to antimicrobials.

| Questions                                                                 | Participant's responses N (%) |
|---------------------------------------------------------------------------|-------------------------------|
|                                                                           | Agree | Disagree | Strongly agree | Strongly disagree |
| Antibiotic resistance is a serious global problem affecting public health | 74 (72.5) | 14 (13.7) | 9 (8.8) | 5 (4.9) |
| Antibiotic resistance affects your health and that of your family         | 71 (69.6) | 15 (14.7) | 13 (12.7) | 3 (2.9) |
| Weak infection control practices by health care professionals will cause the spread of antibiotic resistance | 49 (48.03) | 28 (27.5) | 21 (20.6) | 4 (3.9) |
| In the future you should follow the recommendations of the antimicrobial guidelines in the hospital | 60 (58.8) | 4 (3.9) | 38 (37.3) | 0 (0) |
| The description of antibiotics should be closely controlled               | 57 (55.9) | 11 (10.8) | 29 (28.4) | 5 (4.9) |
| Over-the-counter antibiotic dispensing should be further controlled        | 45 (44.1) | 10 (9.8) | 43 (42.2) | 4 (3.9) |
| The socioeconomic status of people affects the risk of antibiotic resistance | 48 (47.1) | 17 (16.7) | 31 (30.4) | 6 (5.9) |
| Only doctors know the meaning of antibiotic resistance                    | 20 (19.6) | 45 (44.1) | 20 (19.6) | 17 (16.7) |
| Pharmacists play a prominent role in the problem of antibiotic resistance  | 67 (65.7) | 16 (15.7) | 14 (13.7) | 5 (4.9) |
Figure 1: Information sources of participants about resistance to antimicrobials