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DOI: 10.4103/jehp.jehp_629_20

# The effect of public health educational campaign regarding antibiotic use and microbial resistance on knowledge, attitude, and practice in the Iran

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## Abstract:

**INTRODUCTION:** The aim of the present study was to show the effect of public health educational campaign regarding antibiotic use and microbial resistance on knowledge, attitude, and practice of people in Isfahan.

**MATERIALS AND METHODS:** This quasi-experimental study was conducted in October 2019 on the public population in Isfahan (a city in the center of Iran). Simple random sampling was done in ten urban areas. A total of 708 people participated in the study. For assessing the knowledge, attitude, and practice a related researchers-made questionnaire was used in the present study. Finally, data were entered into SPSS (20) and analytical statistics including paired *t*-test were used. The statistical significance level was considered  $<0.05$ .

**RESULTS:** The majority of participants in this study were female 434 (61.9%) and the rest of them were male. The mean  $\pm$  standard deviation of age was 31.68 (11.11), range of 11–67. More than 50 percent of participants had a Bachelor's degree (37.7%) and diploma (27.7%). Most individuals were self-employed 277 (43.1%). About the type of marriage, 54.89% were single and others were married. Results showed that the mean of knowledge and attitude was increased after the intervention ( $P < 0.05$ ).

**CONCLUSION:** Increase knowledge between people, adherence to treatment and minimizes healthcare costs, however, "antibiotics are misused so often because of the belief that these are benign drugs. In the absence of urgent corrective and protective actions, the world is heading towards a postantibiotic era, in which many common infections will no longer have a cure and once again, kill unabated.

## Keywords:

Antibiotic use, educational campaign, Iran

## Introduction

An antibiotic is a type of antimicrobial substance active against bacteria and is the most important type of antibacterial agent for fighting bacterial infections. Antibiotic medications are widely used in the treatment and prevention of such infections.<sup>[1,2]</sup> Antibiotics revolutionized medicine in the 20<sup>th</sup> century. Unfortunately,

it did not take long for resistance to begin.<sup>[1,3]</sup> Numerous ecological studies have confirmed that increased antibiotic consumption has led to the emergence of antibiotic resistance worldwide. Bacterial resistance to antibiotics is one of the biggest challenges that threaten human health in the modern age.<sup>[4,5]</sup>

Studies have proven the correlation between the rate of antibiotic resistance

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**How to cite this article:** Khoshgoftar M, Zamani-Alavijeh F, Kasaian N, Shahzamani K, Rostami S, Nakhodian Z, *et al*. The effect of public health educational campaign regarding antibiotic use and microbial resistance on knowledge, attitude, and practice in the Iran. *J Edu Health Promot* 2021;10:3.

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Received: 06-06-2020  
Accepted: 27-06-2020  
Published: 28-01-2021

and the amount of antibiotic consumption.<sup>[6,7]</sup> In addition, overuse of antibiotics can increase the risk of infection with resistant bacteria resulting in treatment failure, prolonged infectious diseases and increased risk of death. Prolonging the infection period increases the number of infected people in the community and thus increases the risk of transmission of resistant bacteria throughout the community.<sup>[8]</sup>

Antibiotic consumption varies widely between countries. Mongolia had the highest consumption with a rate of 64.4. Burundi had the lowest at 4.4. Amoxicillin and amoxicillin/clavulanic acid were the most frequently consumed.<sup>[9]</sup> According to studies, the wrong use of these drugs, especially in Iran is very high. According to the Iranian national pharmaceutical sales database in 2015, 605 million US dollars was spent on antibiotics that compromise 11.8% of total expenditure on medicine. Iranian spent 7.58 US dollars per capita on systemic antibiotics in 2015.<sup>[10]</sup> Although antibiotic administration is necessary in most bacterial infections and not using it can be life-threatening, but most studies have found that 30%–60% of prescriptions are inaccurate, usually caused by a doctor, distributor, or self-medication.<sup>[11,12]</sup> It is estimated that resistant bacteria cause at least 2 million infections annually in the United States and approximately 25,000 deaths in Europe.<sup>[13]</sup>

Iran is one of the largest antibiotic-consuming countries in the world, and the wrong culture of self-treatment and lack of belief in nonprescription and over-the-counter medication, especially by general practitioners, are among the factors that contribute to the problem.<sup>[14,15]</sup> According to the results of a study in Iran, 86% of the women had experienced self-medication at least in one disease during the past 6 months. The major cause for self-medication had been previous experience and the simple availability of the medications.<sup>[16]</sup> The results of a study in Iran showed that the most common symptom that led students to engage in self-medication was headache.<sup>[17]</sup>

Various steps have been taken to address this problem. In 2011, the theme of World Health Day: “Resistance to antimicrobial drugs, named a global threat.” This issue indicates the importance of the problem and the need for serious action in all population groups.<sup>[18]</sup>

Due to the difference between the use of antibiotics in different countries and the general knowledge about them, populations in need of education should be identified.<sup>[19]</sup> Many studies have reported that irrational use of antibiotics is strongly related to their knowledge and attitude.<sup>[20]</sup> Interventions directed to the improvement of antibiotic use have traditionally been focused on clinicians and pharmacists or have been restricted to evaluate the effects of programs to control

infections associated with health care. Among people, interventions are inadequate, despite the potential to exert substantial effects on them.<sup>[21-23]</sup>

Self-medication has variety causes such as, lack of time for a doctor to cure the problem, the delivery of drugs without a doctor’s prescription by pharmacies, distrust in the quality of medicines and prefer the foreign drugs to the Iranian are important causes for self-medication.<sup>[24]</sup> Also in another educational intervention, Rashidians *et al.* demonstrated that the health belief model is an appropriate model for reducing arbitrary use of antibiotics.<sup>[25]</sup>

The World Health Organization advocates implementing strategies that allow the next generation of doctors to be better prepared to appropriately use antibiotics and combat bacterial resistance. Consistent with the above mentioned, the aim of the present study was to describe the knowledge, attitude, and practice regarding antibiotic resistance and the effect of the educational intervention of people that live in Esfahan. The evaluation of this aspect will facilitate understanding the level of knowledge of these peoples and guiding future interventions.

## Materials and Methods

This quasi-experimental study was conducted in October 2019 on the public population in Isfahan (a city in the center of Iran). Simple random sampling was done in 10 urban areas such as (Enghelab Square, Si O Se Pol Bridge, Isfahan City Center, Chahar Bagh e Abbasi Street and Nazhvan). Inclusion criteria included having literate and were willing to participate in the study and exclusion criteria included those who did not want to complete the questionnaire. A total of 708 people participated in the study that they were not same in pretest and posttest. For assessing the knowledge, attitude, and practice a related researchers-made questionnaire was used in the present study. This questionnaire included four parts: the first part contains demographic information (age, sex, educational level, and job), the second part was knowledge (22 items), the third part was an attitude (10 items), and the fourth part was the practice (5 items). The validity was assessed by 10 specialists in health education and infectious disease and CVR (Content Validity Ratio) was calculated by 3-point scale (necessary, useful but not necessary, and not necessary) according to Lawshe table, CVRs above 0.62 were retained. CVI (Content Validity Index) was calculated by 4-point Likert scale for each item (1 = not clear, 2 fairly clear, 3 = clear, and 4 = quite clear) and values above 0.79 were considered to be acceptable.

Reliability of the questionnaire was approved and Cronbach’s alpha was higher than 0.80 in three-part of the questionnaire.

## Educational campaign

Due to the review of extensive articles that show the high consumption of antibiotics without a doctor's prescription and people's lack of knowledge of the side effects of improper use of the drug, this campaign was planned. Hence, an educational campaign was launched to improve knowledge, attitudes, and performance among people in the city.

The team of researchers designed, tailored messages on antibiotic resistance, such as rest during colds, the lack of antibiotics in viral diseases, the effects of arbitrary antibiotic use, and the need to prescribe medication. The messages are then created by the graphics team with clear and engaging images, as well as the use of cultural elements in campaign areas to get people's attention. Different styles were used in designing the messages such as informative style (increasing awareness about antibiotic resistance, the difference between virus and bacterium and lack of antibiotic effect on viral diseases) and persuasive style (the use of drugs prescribed by a doctor, the need to rest during a cold). Various tools and variations in content, shape, and color were used in the posters of the city to make the messages attractive. First of all, a number of public health students distributed questionnaires in target areas among people. After gathering data in the target areas, five specialists were stationed at the stations (busy places in the city). In the main squares in each area, 2 banners with appropriate educational content were installed. In each station, they distributed educational pamphlets with 2 contents about preventing antibiotic use among the people. The content of the pamphlets was about antibiotic resistance and the ability of people to prevent infections. During the campaign, experts answered questions about antibiotics and how to use them, how to develop antibiotic resistance, and ways to prevent bacterial infections. Over the course of a week, more than 2000 people visited the booths and received training. Posters with 8 different educational contents were installed in public transportations systems such as buses and subway. Furthermore, through TV news and making short films in cyberspace, all people with different tastes and access levels in these areas were covered by the campaign's messages.

Due to the fact that the campaign was held under the auspices of Isfahan University of Medical Sciences, an E-mail campaign was sent to all staff and students of the university regarding the program and information was provided to all faculties and research centers. After 1 week and visiting stations and exposed to messages, a posttest were done and data gathered. Finally, data were entered into SPSS (20) (SPSS Inc., Chicago, IL, USA) and descriptive (mean  $\pm$  standard deviation [SD] and frequency [%]) and analytical statistics including paired *t*-test were used. The statistically significance level was considered  $<0.05$ .

## Results

The majority of participants in this study were female 434 (61.9%) and the rest of them were male. The mean  $\pm$  SD of age was 31.68 (11.11), range of 11–67. More than 50 percent of participants had a Bachelor's degree (37.7%) and diploma (27.7%). Most individuals were self-employed 277 (43.1%). About the type of marriage, 54.89% were single and others were married. In Table 1, the results showed that the mean of knowledge and attitude were increased after the intervention ( $P < 0.05$ ).

Table 2 compares the frequency distribution of some of the items considered in the study before and after the intervention. As the results of Table 2 show, in the past month and the last week, the intervention, the rate of use of to take antibiotics in participants has decreased significantly ( $P < 0.05$ ). Furthermore, in the reasons for using antibiotics after the training intervention, the rate of consumption in cases of fever and urinary tract infection has decreased and in the variable of respiratory diseases, pain/inflammation has been significantly increased ( $P < 0.05$ ). In addition, after the training intervention, the time to use the antibiotic before and after the meal has increased significantly ( $P < 0.05$ ).

## Discussion

The intricate of antibiotic resistance and overusing poses a global threat to public health now. In Iran, no organized work has been designed to improve the knowledge of the general population on the appropriate use of antibiotics and the importance of antimicrobial resistance yet.

In this study, we investigated knowledge, attitude, and practice of antibiotics' use and miss-use in the general population of Isfahan, Iran, and the effects of an educational campaign on them.

The main results of this study demonstrated that after the educational campaign, people's awareness of antibiotic resistance increased.

The level of awareness and attitude of the people studied after the educational intervention was significantly higher than before the intervention which is consistent

**Table 1: Comparison of mean and standard deviation of knowledge and attitude about - before and after implementation of educational campaign**

Scale	Mean $\pm$ SD		P
	Before intervention	After intervention	
Knowledge	23.27 $\pm$ 4.33	38.96 $\pm$ 5.67	<0.001
Attitude	15.00 $\pm$ 3.99	25.61 $\pm$ 3.24	<0.001

About practice, the number of people taking antibiotics last week has decreased significantly compared to before the intervention ( $P=0.031$ ). SD=Standard deviation

**Table 2: Comparison of the frequency distribution of some study items before and after the educational intervention**

Demographic variable	Before intervention (n=708)	After intervention (n=708)	P
The last time to take antibiotics			
1 year ago	252 (35.6)	253 (35.7)	NS
6 months ago	144 (20.3)	166 (23.4)	NS
1 months ago	167 (23.6)	155 (21.9)	0.031
last week	105 (14.8)	94 (13.3)	0.048
No consumption	40 (5.6)	40 (5.6)	NS
Source of antibiotic use			
Prescribed by a physician	521 (73.6)	520 (73.4)	NS
Prepared by the pharmacy without a prescription	100 (14.1)	99 (14)	NS
The remaining drugs at home	51 (7.2)	51 (7.2)	NS
No answer	37 (5.2)	37 (5.2)	NS
The reason for taking antibiotics			
Fever	170 (24)	163 (23)	0.045
respiratory diseases	63 (8.9)	81 (11.4)	0.028
Pain/inflammation	110 (15.5)	127 (17.9)	0.012
Urinary tract infection	65 (9.2)	56 (7.9)	0.041
Skin problem/wound	37 (5.2)	35 (4.9)	NS
Others	1 (0.1)	0 (0)	NS
No answer	262 (37)	264 (34.7)	NS
Antibiotic use time			
Before meals	35 (4.9)	44 (6.2)	0.024
after the meal	206 (29.1)	212 (29.2)	0.039
With food	31 (4.4)	31 (4.4)	NS
According to the doctor's instructions	368 (52)	360 (50.8)	NS
No answer	68 (9.6)	68 (9.6)	NS

NS=Not significant

with other studies. Many antibiotic campaigns address the awareness and knowledge of antimicrobial resistance.<sup>[26,27]</sup> The majority agreed with the statement “antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well.” Knowledge of antibiotics seems to be fragmentary in the general population.<sup>[28,29]</sup>

However, no significant change was observed in the performance of individuals after the implementation of the campaign, which did not coincide with the interventions of Rashidian *et al.*<sup>[25]</sup> One of the possible reasons for this result can be interpreted as the fact that the campaign was held at the peak of antibiotic use, i.e., the autumn and winter seasons.

The questionnaire was also about antibiotic use over the past few months, so people's performance has not changed significantly since the intervention.

Regarding the amount of antibiotic use before the intervention, 14% of people stated that they had taken antibiotics during the week, and after the intervention, this amount was reduced to 13%.

In addition to increasing awareness and knowledge of antibiotics, competencies such as health literacy should be targets of intervention, especially in the primary

health-care setting. When people are ill, they tend more to take risks and to accept side effects, even if they know the expected benefits are low.<sup>[30]</sup>

Given that previous studies have suggested that self-medication is influenced by both education and the law, this intervention has only dealt with the education sector. Therefore, according to the obtained results, it is necessary for patients to pay attention to the appropriate rules in prescribing drugs and receiving drugs from pharmacies.

Previous studies in different populations have revealed self-medication is influenced by many factors such as education, family, society, law, availability of drugs, and exposure to advertisements.<sup>[17,31]</sup>

The proportion of respondents who thought antibiotics were effective for viral infection was low the percentage. The possible reason for the insufficient knowledge in this field can be the lack of knowledge in of the difference between viruses and bacteria.

In the present study, we focused on a small set of very specific knowledge concerning the use of antibiotics that we thought would be the essential knowledge that to know would make a difference in prescription routines at scale (i.e., differentiate between cold, flu, virus, and



bacteria). Nonetheless, future investigations should elaborate on the full complexity of knowledge and its influence on decision-making in antibiotics.

## Conclusion

We expect to create whit increase knowledge between people, adherence to treatment, and minimizes health-care costs, however, “antibiotics are misused so often because of the belief that these are benign drugs. In the absence of urgent corrective and protective actions, the world is heading toward a postantibiotic era, in which many common infections will no longer have a cure and once again, kill unabated.

Part of the problem regarding AR is that, even though the problem is global and affects us all, it is still not being addressed in all countries. This study, therefore, attempts to obtain a wider perspective by the evaluation of people’s knowledge that lives in a city.

## Limitation

There were some limitations in this article such as not having a control group in this study. Hence, we suggested another researcher use the control group to do a better comparison. The questionnaires were completed by self-administered; this could be bias in data and result. Moreover, because the seven areas were included not all-regions, external validity was compromised. Furthermore, the influence of the prescriber was not measured.

## Acknowledgments

The authors would like to acknowledge Research Deputy of Isfahan University of Medical Sciences and all the participants for their contribution to this study.

## Ethical aspects

The study was approved by the Ethics Committee of Isfahan University of Medical Sciences (IR. MUI. MED. REC.1398.470).

The study population was informed about the objectives and process of the study, that the data gathered would be anonymized and used for publication and that the study participants were totally voluntary. Written consent was obtained before the questionnaires were distributed.

## Financial support and sponsorship

This article is the result of a research proposal (298132) that approved by the Isfahan University of Medical Sciences.

## Conflicts of interest

There are no conflicts of interest.

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