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Examine the Growing Problem of Antibiotic Resistance and its impact on Public Health

Naif Sultan Al Saadon[1]*, Bader Abdulaziz Al Hasson[2], Mohammed samir Al Anazi[3], Fahed Mamdouh Alanazi[4], Mohammed Kareem Al-Enezi[5]

[1,2] Pharmacist, Prince Sultan Military Medical City, Riyadh KSA

[3,4,5] Pharmacy Technician, Prince Sultan Military Medical City, Riyadh KSA

Abstract - Antibiotic resistance has been rising rapidly in recent years, with Saudi Arabia having the highest frequency of resistant infections in the Gulf Region. Despite legal restrictions on antibiotic distribution, their misuse remains widespread. The purpose of this research was to examine how much Saudi university students know about antibiotic resistance and how often they properly utilize antibiotics. The research method was a cross-sectional analytic approach. Bachelor students' perspectives on antibiotic resistance and antibiotic usage were gathered using a self-administered survey. To recruit the necessary 825 individuals, a two-stage stratified cluster sampling procedure was used. Seventy-five percent or more of college students knew about antibiotic resistance (95% confidence interval [CI]: 72.09%–77.98%), and 54.67 percent [CI]: 51.26–58.03 percent knew about antibiotic resistance as a public health concern. The most prevalent types of antibiotic abuse were not completing the full course of treatment or taking medications that had expired (95% CI: 63.63% - 70.04%). Knowing about antibiotic resistance reduced the likelihood that students would abuse antibiotics by 27.96 percent (OR = 0.7204, p = 0.0642). One's odds of misusing antibiotics drops by 51.32 percent if one is aware that antibiotic resistance is a public health concern (OR = 0.4868, p 0.0001). Antibiotic abuse decreases when people are aware of the problem of antibiotic resistance. More effort should be put into spreading awareness about the dangers of antibiotic overuse and the rise of antibiotic resistance.

Keywords - Antibiotic Resistance, Public Health, Consequences, Saudi Arabia and Medications

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INTRODUCTION

When bacteria or other microorganisms develop defenses against antimicrobials (drugs used to treat illnesses), this phenomenon is known as antimicrobial resistance (AMR). There is the potential for drug-resistant strains to emerge across all microbial groups. Antifungal resistance develops in fungi. Viral drug resistance develops over time. Antiprotozoal resistance in protozoa is analogous to antibiotic resistance in bacteria. All of these problems may be grouped together under the heading of antibiotic resistance. Superbug is another name for bacteria that has developed resistance to numerous antibiotics, or multidrug resistant (MDR) bacteria. Although antimicrobial resistance occurs naturally, it is often caused by inappropriate medication use and inadequate care for illnesses.

Specific bacteria that have developed resistance to antibiotics constitute a significant component of AMR known as antibiotic resistance. Bacterial resistance may occur spontaneously via genetic mutation or by the horizontal transfer of resistance across species. Resistance may emerge both naturally, as a result of random mutations, and artificially, via the horizontal transfer of resistant genes. However, there is evidence that shows that prolonged use of antibiotics promotes selection for mutations that might eventually make antibiotics useless. Fungi that have developed resistance to antifungals are an example of antimicrobial resistance (AMR). Natural mechanisms for the development of antifungal resistance include mutation and aneuploidy. When antifungals are used repeatedly, resistant strains of the fungi eventually emerge.

Millions of people every year lose their lives to diseases brought on by bacteria that carry AMR. About 1.27 million people throughout the world lost their lives this year due to antibiotic-resistant germs. Resistance in microorganisms makes it more difficult to treat infections caused by them, sometimes necessitating treatment with either stronger antimicrobial treatments, more costly antibiotics, or even potentially more toxic alternatives. These methods could be more expensive as well.

Taking antibiotics exclusively as directed by a doctor is one way to avoid the overuse of these drugs and

the subsequent development of antibiotic resistance. Since resistance and adverse effects are less likely to occur when targeting particular species, narrow-spectrum antibiotics are favored over broad-spectrum antibiotics when applicable. Home users of these drugs need to be taught how to use them safely. Proper sanitation and hygiene, such as handwashing and disinfection between patients, may reduce the transmission of resistant illnesses, and healthcare personnel should urge their patients, visitors, and families to do the same. Use of antimicrobials in people and other animals, and the subsequent dissemination of resistant strains amongst them, is largely to blame for the alarming rise in antibiotic resistance. Inadequately treated effluents from the pharmaceutical sector, particularly in nations where bulk medicines are generated, have been related to the spread of resistance.

LITERATURE REVIEW

Khilnani, Gurudas & Khilnani, Ajeet Kumar. (2019). In the ancient world, microbes were already well-documented. Soil microorganisms (fungi and bacteria) have been a source of antibiotics since long before they were used in hospitals and clinics. These bioactive compounds occurred spontaneously throughout microbial evolution. Antibiotic generating and antibiotic resistant microbes have coevolved over billions of years. In 1900, Paul Ehrlich proposed the idea of "Magic Bullets" to combat germs, and in 1906, Salvarsan was used to treat syphilis for the first time Otten (1986) notes that prontosil and its metabolite sulphadiazine were used to treat infections by Domagk (1933). Penicillin was first used in therapeutic settings in 1940, although its discovery dates back to 1928. As a result, the issue of antibiotic resistance (AR) is becoming a more serious threat to human health worldwide (Petri, 2011). Resistance to antibiotics is a growing public health concern due to environmental gene mixing and the unchecked use of antibiotics in livestock and poultry farms. Overuse of antibiotics, poor hygiene practices, and a general lack of understanding about the gravity of the AR are all becoming recognized as controllable factors.

Bonna, Atia & Pavel, Shahed & Ferdous, Jannatul & Khan, Sabbir & Ali, Mohammad. (2022). Bangladesh's weak healthcare system and rampant drug abuse contribute significantly to the worldwide issue of antibiotic resistance. Antibiotic self-medication seems to be widespread in poorer nations, where studies have shown that access to these medications is both simple and poorly regulated. Antimicrobial resistance (AMR) has spread in Bangladesh due to over-prescribing and improper usage of medicines. Qualitative research analyzing the factors that influence antibiotic sales and dispensing across all types of healthcare providers are few in low and middle-income settings. Antibiotics were widely misused by several sectors of the healthcare industry due to misunderstandings and a lack of knowledge. Healthcare practitioners, especially those with little or no training or those working in rural regions, showed a striking lack of understanding of antibiotic action and antibiotic resistance. Educational messaging on the sensible use of antibiotics and how they operate, aimed at all kinds of healthcare practitioners, should be among the most specific and focused treatments to reduce AMR in Bangladesh.

Nadgir, Chinmayee & Biswas, Dalia. (2023). Resistance to antibiotics is a major problem that has far-reaching consequences for disease control efforts. Antibiotic resistance has emerged as a major public health problem, and one of the main causes has been the widespread misuse of antibiotics and negligent prescribing by physicians. Overuse, antibiotic resistance genes, and widespread use of antibiotics in agriculture are only few of the major causes highlighted in this article. It also highlights the difficulties in treating illnesses including TB, COVID-19, and vancomycin-resistant enterococci infections due to drug resistance. A case study illustrating the dangers of antibiotic resistance in TB therapy is provided in the article. Antibiotic resistance has serious consequences for the management of patients with COVID-19, as this paper demonstrates. It goes on to detail strategies that may be used on both a global and personal scale to reduce antibiotic resistance. The aim of minimizing antibiotic misuse is to diminish antibiotic resistance, and new research suggests that proteins produced by the body may be changed and employed in therapies to achieve this objective.

Bansal, O. (2022). ABSTRACT OF THE ARTICLE Antibiotics, a miracle medication, have helped save countless lives since they were first developed. Antibiotic resistance is a major public health concern due to the widespread overuse of antibiotics in human and animal medicine, agriculture, aquaculture, and other non-medical settings. Groundwater, sea water, crops, and food animals all contain antibiotic residues, which disrupts ecological equilibrium and has direct and indirect effects on human health. This overview explains how antibiotics may get into the environment and what can be done to lessen the spread of bacteria that are resistant to antibiotics.

Ferri, Maurizio & Ranucci, Elena & Romagnoli, Paola & Giaccone, Valerio. (2015) In the past two decades, antimicrobial resistance (AMR) has emerged as a major problem for the world's health care systems. Antimicrobial resistance (AMR) has been a rising global concern since the dawn of the antibiotic era, with the discovery of the first drugs that consistently improved human treatment. This study provides a comprehensive review of the epidemiology of antimicrobial resistance (AMR), concentrating on the connection between food-producing animals and people, as well as the legislative framework and policies being applied at the European Union (EU) level and internationally. Strategies for addressing the problems associated

with antimicrobial resistance include developing novel antimicrobials; bolstering the AMR surveillance system in animal and human populations; learning more about the ecology of resistant bacteria and resistant genes; and educating stakeholders on the responsible use of antibiotics in animal productions and clinical settings. Given the widespread nature of AMR and the fact that bacterial resistance may spread across geographic and societal boundaries, the essay concludes with concrete suggestions organized around a holistic approach and directed at various stakeholders.

RESEARCH METHODOLOGY

The research method was a cross-sectional analytic approach. Participants were undergraduates from King Faisal University (KFU).

EpiInfo® version 7 was used to determine the sample size, which was based on the 2018-2019 KFU student population of 37,607 bachelor students, the reported prevalence of antibiotic misuse from the study and a confidence limit of 5% The schools and students who would take part in the research were selected using a two-stage stratified cluster selection strategy. This allowed for an adequate sample size of 748. All undergraduates at King Faisal University who were enrolled in a bachelor's degree program were deemed eligible. Online students were also disqualified, as were those in preparatory years, diploma programs, graduate programs, and postgraduate degrees. Medical, allied health, and pharmacy students, as well as those from schools of education, business, and computer and information science, made up the bulk of the 825 respondents.

All student replies were kept anonymous and private, and students were given the option to participate in the research. Ethical permission was acquired by the study Ethics Committee of the Deanship of Research at King Faisal University in Al-Ahsa, KSA (KFU - REC/2019 - 11 - 03) after the study proposal was approved by the Department of Public Health.

Information was gathered via responses to self-administered surveys. Information was entered into Microsoft Excel and checked for inconsistencies before being processed statistically using EpiInfo® version 7. The demographic data was subjected to a descriptive analysis. Students' levels of knowledge on antibiotic resistance as a public health issue were also estimated. Estimation of proportion was also used to calculate the percentage of kids that inappropriately utilize antibiotics. Finally, logistic regression was used to analyze the correlation between antibiotic usage and knowledge of antibiotic resistance and knowledge of antibiotic resistance as a public health concern.

The data was gathered between November 4, 2019, and November 21, 2019, at King Faisal University's main campus in Hofuf, Al Ahsa, Kingdom of Saudi Arabia.

DATA ANALYSIS

Antibiotic resistance in Saudi Arabia

Reports indicate that bacterial resistance is on the rise in Saudi Arabia Antibiotics are the third most often given drug in Saudi Arabia. There is growing worry that the distribution of antibiotics without a doctor's prescription contributes to the spread and elevation of antimicrobial-resistant bacteria and antimicrobial resistance The infection and colonization rates of HA methicillin-resistant S.= aureus (MRSA) in Saudi Arabia rose from 2.17 to 3.9 per 1,000 admissions in only four years (2000–2004). Community-acquired MRSA was shown to have a daily incidence rate of between 10 and 30 per 100,000 patients in another Saudi investigation The prevalence of methicillin-resistant Staphylococcus aureus (MRSA) among S. aureus was 32%, that of penicillin G-resistant Streptococcus pneumonia (S. pneumonia) was 33%, and that of erythromycin-resistant S. pneumonia was 26%

Seventy-six percent of the healthcare personnel tested positive for MRSA colonization [44], while 25.3 percent of 150 senior medical students and interns in Jeddah tested positive for nasal colonization with S. aureus. Around 7.0% had MRSA in their systems Forty percent of Saudi healthcare workers had S. aureus colonization, with 18 percent having MRSA [46]. According to a 2018 meta-analysis that compiled data from 7 separate studies involving 8,433 people, the national prevalence of methicillin-resistant Staphylococcus aureus (MRSA) was 38%. Regionally, the prevalence ranged from 32% in the central United States to 42% in the west. From 2000 to 2006, ciprofloxacin resistance among Enterobacter cloacae in Saudi Arabia increased from 8.3 percent to 17.4 percent Another research found that between 1998 and 2003, Klebsiella pneumonia's HA resistance to ciprofloxacin increased from 2.6% to 23.0%.

The growing problem of antimicrobial resistance

Since this is a problem on a worldwide scale, it is fitting that the WHO is helping to raise awareness of it and formulate policies to address it. Case in point: the recent appearance and subsequent discovery in Canada of gram-negative bacteria containing the NDM-1 gene. Bacteria belonging to the family Enterobacteriaceae, which includes but is not limited to Escherichia coli and Klebsiella pneumoniae. They are resistant to almost all antibiotics and have a plasmid that makes them immune to all beta-lactam antibiotics except aztreonam. These germs, which quickly went global, seem to have arisen in India. Local transmission seems to be the case for the NDM-1 bacterium recently found in 1 of 2 Ontario patients.

The use of antimicrobials for any purpose is linked to the development of bacterial populations that are resistant to such drugs. The lifespan of these important medications may be prolonged by the elimination or decrease of underuse (related with insufficient dosage or duration), misuse (poor selection), and abuse (unnecessary use). According to the World Health Organization, "over half the world's antimicrobial production is used in food-producing animals". This is because of the "massive routine use of antimicrobials, to promote growth and for prophylaxis," in the industrialized production of food. The World Health Organization (WHO) released a set of policies for World Health Day, including a call for countries to commit to a fully funded national plan, increased surveillance and laboratory capacity, regulation and promotion of rational use of medicines, improved infection prevention and control, and support for innovations and research and development.

Demographic Profile of Study Participants

Table 1 shows that of the total respondents, 50.42 percent were enrolled in a health-related program (Medicine, Applied Medical Sciences, or Pharmacy) while 49.58 percent were enrolled in a non-health-related program (Education, School of Business, or Computer Science and Information Technology). Male respondents numbered 403 (48.85%) while female respondents numbered 422 (51.15%). Subjects in the research varied in age from 18 to 26. Most participants were in their twenties; students aged 18 to 22 made up over 90% of the entire sample.

Awareness of Antibiotic Resistance

Table 2 displays the percentage of college students who are aware of the issue of antibiotic resistance.

Table 1: Sociodemographic profile of university students.

Variable	Frequency	Percentage
Gender		
Male	403	48.85
Female	422	51.15
Age Group		
Below 20	362	43.88
21-22	373	45.21
23-24	86	10.42
25 and above	4	0.48
College		
Medicine	168	20.36
Education	170	20.61
School of Business	130	15.76
Applied Medical Science	169	20.48
Computer Science and Information Technology	109	13.21
Pharmacy	79	9.58

Table 2. Awareness antibiotic resistance among university students.

Sociodemographic Variable	Aware			Unaware		
	Count	%	95% CI	Count	%	95% CI
Gender	-	-	-	-	-	-
Male	301	74.69	70.23-78.69	102	25.31	21.31-29.77
Female	319	75.59	71.28-79.45	103	24.41	20.55-28.72
Age Group	-	-	-	-	-	-
Below 20	97	63.82	55.64 - 71.44	55	36.18	28.56-44.36
20-21	311	74.76	78.66-78.69	105	25.24	21.31-29.63
22 – 23	199	83.97	78.66-88.40	38	16.03	11.60-21.34
24 and above	13	65.00	40.78-84.61	7	35.00	15.39-59.22
College	-	-	-	-	-	-
Medicine	159	94.64	90.07-97.52	9	5.36	2.48-9.93
Education	100	58.82	51.03-66.30	70	41.18	33.70-48.97
School of Business	82	63.08	54.17-71.37	48	36.92	28.63-45.83
Applied Medical Science	124	73.37	66.04-79.87	45	26.63	20.13-33.96
Computer Science and Information Technology	76	69.72	60.19 - 78.16	33	30.28	21.84 - 39.81
Pharmacy	79	100.00	95.44-100.00	0	0.00	0.00 - 4.56

Awareness of antibiotic resistance was high among both male and female students. When students were divided into groups based on their ages, those between the ages of 22 and 23 had the highest rate of knowledge on antibiotic resistance. Students from health-related institutions made up 58.39% of the 620 aware participants, while students from other institutions made up 41.61%. A total of 205 kids, or 73.66 percent, came from schools where antibiotic resistance education was not required. The majority of students (40.73 percent, 95% confidence interval [CI]: 37.43 percent to 44.12 percent) learned about antibiotic resistance from medical experts including physicians, pharmacists, and nurses. However, Internet and social media were the primary source of knowledge for 39.76% of the students (95% CI: 36.37 - 43.14%).

Awareness of Antibiotic Resistance as a Public Health Problem

Only 451 (54.67%) of the 825 people surveyed knew that antibiotic resistance is a major health concern in the world today. Antibiotic resistance was more well known to be a public health concern amongst female students. Students between the ages of 22 and 23 had the highest rate of awareness that antibiotic resistance is a public health issue, relative to other age groups. Of the 451 participants, 67.85% were students from health colleges and 32.15 % were students from non-health schools who were aware that antibiotic resistance is a public health concern. Table 3 shows that 70.59 percent of the 374 students who did not know that antibiotic resistance is a public health hazard were not enrolled in a health-related institution.

Students relied on the Internet and social media for almost 40% of their antibiotic resistance knowledge (95% CI: 36.47 - 43.14%). Health care providers (doctors, pharmacists, and nurses) were the primary

sources of information for a larger percentage of the population (40.73 %, 95% CI: 37.43 - 44.12 %). Family and friends were the source of information for 19% (95% CI: 16.50-21.85%).

Antibiotic use among University Students

Table 4 shows that antibiotic usage was common among college students (67.09%, 95% CI: 63.63 - 70.04%). Students from non-health institutions made up a somewhat larger percentage of antibiotic misusers (56.16%) than students from health schools (43.84%) within the total sample size of 552. A total of 273 students (36.26% from non-health institutions and 63.74% from health colleges) were found to be antibiotic-safe. Antibiotics were more often abused by male pupils than female students. People younger than 20 years old were more likely to inappropriately utilize antibiotics than any other age group.

Table 3: Awareness on antibiotic resistant is a public health problem among university students.

Sociodemographic Variables	Aware			Unaware		
	Count	Proportion	95% CI	Count	Proportion	95% CI
Gender						
Male	204	41.47	44.53-54.24	204	50.62	45.76-55.47
Female	247	66.09	36.87-46.23	175	49.38	36.87-46.23
Age Group						
Below 20	53	34.87	27.33 – 43.01	99	65.130	56.99 – 72.67
20 – 21	225	54.09	94.28 – 58.82	191	45.91	41.18 - 50.72
22 – 23	167	70.46	64.21 – 76.19	70	29.54	23.81 – 35.79
24 and above	6	30.00	11.89 – 54.28	14	70.00	45.72 – 88.11
College						
Medicine	147	87.50	81.53 – 92.09	21	12.50	7.91 – 18.47
Education	63	37.06	29.97 – 44.79	107	62.94	55.21 – 70.21
School of Business	42	32.31	24.37 – 41.01	88	67.69	58.93 – 75.63
Applied Medical Science	84	49.70	41.93 – 57.48	85	50.30	42.52 – 58.07
Computer Science	40	36.70	27.67 – 46.47	69	63.30	53.53 - 72.33
Pharmacy	75	94.94	87.54 – 98.60	4	5.06	1.40 – 12.46

Table 4: Antibiotic use of university students among university students by sociodemographic variables.

Sociodemographic Variable	Not Misuse			Misuse		
	Count	Proportion	95% CI	Count	Proportion	95% CI
Gender						
Male	109	27.05	22.94 - 31.59	294	72.95	68.41 - 77.06
Female	164	38.86	34.33 - 43.59	258	61.14	56.41 - 65.67
Age Group						
Below 20	42	27.63%	20.70 - 35.46	110	72.37%	64.54 - 79.30
20 – 21	138	33.17%	28.82 - 37.83	278	66.83%	62.17 - 71.18
22 – 23	87	36.71%	30.56 - 43.19	150	63.29%	56.81 - 69.44
24 and above	6	30.00%	11.89 - 54.28	14	70.00%	45.72 - 88.11
College						
Medicine	74	44.05	36.41-51.90	94	55.95	48.10 - 63.59
Education	43	25.29	18.95 - 32.52	127	74.71	67.48 - 81.05
School of Business	35	26.92	19.52 - 35.40	95	73.08	64.60 - 80.48
Applied Medical Science	59	34.91	27.75 - 42.61	110	65.09	57.39 - 72.25
Computer Science	21	19.27%	12.34 - 27.93	88	80.73%	72.07 - 87.66
Pharmacy	41	51.90%	40.36 - 63.29	38	48.10%	36.71 - 59.64

Several forms of antibiotic abuse among college students were examined. The most prevalent abuse of antibiotics was not finishing the full course of treatment, as seen in Table 5. This was then followed by the use of antibiotics that had already been used, the sharing of medicines, the failure to take the whole recommended amount, self-medication, and lastly the use of antibiotics that had long since expired.

Crude Association between the Study Variables and Antibiotic Misuse

Table 6 shows that among college students, females had a 41.67 percentage point lower risk of misusing antibiotics than males do (OR = 0.5933, p = 0.0003).

Table 5: Forms of antibiotic misuse of university students.

Type of Antibiotic Misuse	Count	Proportion (%)	95% CI	
Incomplete Antibiotic Dose				
Yes	233	28.24	25.28	31.41
No	592	71.76	68.59	74.72
Expired Antibiotics				
Yes	22	2.67	1.77	4.00
No	803	97.33	96.00	98.23
Use of Leftover Antibiotics				
Yes	312	37.82	34.57	41.18
No	513	62.18	58.82	65.43
Sharing of Antibiotics				
Yes	274	33.21	30.08	36.50
No	551	66.79	63.50	69.92
Incomplete Antibiotic Course				
Yes	346	41.94	38.62	45.34
No	479	58.06	54.66	61.38
Self-Medication				
Yes	145	17.58	15.13	20.32
No	680	82.42	79.68	84.87

Table 6: Crude association between awareness on antibiotic resistance and antibiotic misuse of university students.

Variables	OR	95% C.I.		*p*-value
Gender				
Female	0.5833	0.4346	0.7829	0.0003
Male	1.0000			
Type of College				
Health	0.4443	0.3296	0.5989	0.0000
Non-health	1.0000			
Age				
Older	0.6398	0.4752	0.8616	0.0033
Younger	1.0000			
Awareness on Antibiotic Resistance				
Aware	0.7204	0.5090	1.0195	0.0642
Unaware	1.0000			
Awareness on Antibiotic Resistance as a Public Health Problem				
Aware	0.4868	0.3601	0.6580	<0.0001
Unaware	1.0000			

There was a 55.57 percent decrease in antibiotic overuse among health college students compared to those who attended non-health institutions (OR = 0.4443, p 0.0001). Antibiotic abuse was 36.02 percent less common among students 35 and older than among those 16 and younger (OR = 0.6398, p = 0.0033). There was a 27.96% decrease in antibiotic overuse among students who were aware of antibiotic resistance compared to those who were not (OR = 0.7204, p = 0.0642). Antibiotic abuse was 51.32 percent less common among students who were aware of antibiotic resistance as a public health concern compared to those who were not (OR = 0.4868, p 0.0001).

Adjusted Association between the Study Variables and Antibiotic Misuse

Students who were aware of antibiotic resistance were 3 percentage points less likely to misuse antibiotics compared to students who were not aware of antibiotic resistance (OR = 0.9700, p = 0.8724), while controlling for sociodemographic factors. As can be seen in Table 7, there has been a shift of 34.64 percentage points in the correlation between knowledge of antibiotic resistance and improper use of antibiotics.

Antibiotic abuse was 33.74 percent less common among students who were aware that antibiotic resistance is a public health concern, after controlling for gender, age, and institution type (OR = 0.6626, p = 0.0151). Antibiotic abuse has decreased by 36.25 percent because students became aware that antibiotic resistance is a public health issue (Table 8).

Table 7: Adjusted association between awareness on antibiotic resistance and antibiotic misuse among university students.

Variables	OR	95% C.I.		*p*-value
Awareness on Antibiotic Resistance				
Aware	0.9700	0.6687	1.4070	0.8724
Unaware	1.0000			
Gender				
Female	0.5429	0.3961	0.7442	0.0001
Male	1.0000			
Age				
Older	0.6633	0.4739	0.9284	0.0167
Younger	1.0000			
Type of college				
Health	0.5241	0.3774	0.7280	0.0018
Non-health	1.0000			

Table 8. Adjusted association between awareness on antibiotic resistance as a public health problem and antibiotic misuse among university students

Variable	OR	95% C.I.		*p*-value
Awareness on Antibiotic Resistance as Public Health Problem				
Aware	0.6626	0.4754	0.9235	0.0151
Unaware	1.0000			
Gender				
Female	0.5607	0.4082	0.7702	0.0004
Male	1.0000			
Age				
Older	0.7061	0.5022	0.9929	0.0454
Younger	1.0000			
Type of College				
Health	0.5931	0.4234	0.8309	0.0024
Non-health	1.0000			

CONCLUSION

In conclusion, this survey found that 80% of college freshmen were familiar with the concept of antibiotic resistance, with 50% understanding that this issue represents a public health threat. The research also found that students who were aware of antibiotic resistance were less likely to abuse antibiotics than those who were not. In addition, compared to students who were not aware that antibiotic resistance is a public health concern, those who were were less likely to abuse antibiotics. Awareness of antibiotic resistance and the fact that antibiotic resistance is a public health hazard led to a decrease in antibiotic overuse among college students.

REFERENCES

1. Khilnani, Gurudas & Khilnani, Ajeet Kumar. (2019). Antibiotic Resistance. 10.5281/zenodo.5765831.

2. Bonna, Atia & Pavel, Shahed & Ferdous, Jannatul & Khan, Sabbir & Ali, Mohammad. (2022). Antibiotic Resistance: An Increasingly Threatening but Neglected Public Health Challenge in Bangladesh. International Journal of Surgery Open. 10.1016/j.ijso.2022.100581.

3. Nadgir, Chinmayee & Biswas, Dalia. (2023). Antibiotic Resistance and Its Impact on Disease Management. Cureus. 15. 10.7759/cureus.38251.

4. Bansal, O. (2022). IMPACT OF ANTIBIOTICS ON HUMAN AND ENVIRONMENT. 10. 35125-35129.

5. Ferri, Maurizio & Ranucci, Elena & Romagnoli, Paola & Giaccone, Valerio. (2015). Antimicrobial Resistance: A Global Emerging Threat to Public Health Systems. Critical reviews in food science and nutrition. 57. 10.1080/10408398.2015.1077192.

6. aidi SF, Alotaibi R, Nagro A, et al. Knowledge and attitude towards antibiotic usage: A questionnaire-based survey among pre-professional students at King Saud bin Abdulaziz University for Health Sciences on Jeddah Campus, Saudi Arabia. Pharmacy (Basel) 2020; 8(1): 5.

7. Alghadeer S, Aljuaydi K, Babelghaith S, Alhammad A, Alarifi MN. Self-medication with antibiotics in Saudi Arabia. Saudi Pharm J 2018; 26(5): 719-24.

8. Al-Shibani N, Hamed A, Labban N, Al-Kattan R, Al-Otaibi H, Alfadda S. Knowledge, attitude and practice of antibiotic use and misuse among adults in Riyadh, Saudi Arabia. Saudi Med J 2017; 38(10): 1038-44.

9. AboAlSamh A, Alhussain A, Alanazi N, Alahmari R, Shaheen N, Adlan A. Dental students' knowledge and attitudes towards antibiotic prescribing guidelines in Riyadh, Saudi Arabia. Pharmacy (Basel) 2018; 6(2): 42.

10. World Health Organization. Antibiotic Resistance: Multi-country public awareness survey [Internet]. Geneva, Switzerland: WHO Available from: https://www.who.int/drugresistance/documents/baselinesurveynov2015/en/

11. Higuita-Gutiérrez LF, Roncancio Villamil GE, Jiménez Quiceno JN. Knowledge, attitude, and practice regarding antibiotic use and resistance among medical students in Colombia: A cross-sectional descriptive study. BMC Public Health 2020; 20(1): 1861.

12. Zucco R, Lavano F, Anfosso R, Bianco A, Pileggi C, Pavia M. Internet and social media use for antibiotic-related information seeking: Findings from a survey among adult population in Italy. Int J Med Inform 2018; 111: 131-9.

13. Bell BG, Schellevis F, Stobberingh E, Goossens H, Pringle M. A systematic review and meta-analysis of the effects of antibiotic consumption on antibiotic resistance. BMC Infect Dis 2014; 14(1): 13.

14. Van Boeckel TP, Gandra S, Ashok A, et al. Global antibiotic consumption 2000 to 2010: An analysis of national pharmaceutical sales data. Lancet Infect Dis 2014; 14(8): 742-50.

15. Hawking MK, Lecky DM, Touboul Lundgren P, et al. Attitudes and behaviours of adolescents towards antibiotics and self-care for respiratory tract infections: A qualitative study. BMJ Open 2017; 7(5): e015308.

Corresponding Author

Naif Sultan Al Saadon*

Pharmacist, Prince Sultan Military Medical City, Riyadh KSA