Research Article

Antibiotics to cure or harm: Concept of antibiotic resistance among health professional students in Nepal

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Abstract

Background: Antibiotic is a wonder drug used in the treatment and control of microbial infections and resistance to such drug is a major global health issue because of its extensive and improper use. Health professional students being easy to mould should be made aware to focus on the social aspects of antibiotic management especially the knowledge, attitudes, and practices so that they can aware and help the general population regarding the judicious use of antibiotics in future.

Objective: The objective of this study was to assess the knowledge, attitudes, and practices of health professional students of Birgunj, Nepal towards the use of antibiotic and antibiotic resistance.

Material and methods: A cross-sectional study was carried out in two health institutions of Birgunj, Nepal. Data were collected through convenient sampling technique, using a pre-tested structured questionnaire. A total of 176 respondents belonging to Nursing and Dental backgrounds were included in current study.

Results: It was found that 87.5% of the respondents started antibiotic usage with doctor's consultation, whereas, 84.7% of respondents said that indiscriminate and injudicious usage of antibiotics can lead to increased adverse effects on human body. About 98.3% respondents suggested the requirement of more education about antibiotics. Moreover, 61.9% of respondents completed full course of treatment while they were ill. Surprisingly, 19.69% of respondents were unsure about the causes of antibiotic resistance.

Conclusion: The level of knowledge and attitude about antibiotic and its resistance amongst the health professional students is high; however, practice of antibiotic is still poor.

KEY WORDS: Antibiotic,antibiotic resistance,antibiotic usage,nursing and dental students

Introduction

Antibiotic is from the term "antibiosis", which means "against life", and was first introduced by the French Bacteriologist Vuillemin, it was hailed as "wonder drugs", the miracles of modern medicine.[1] This is defined as a substance produced by a microorganism or a similar substance produced by chemical synthesis and is capable of inhibiting the growth (bacteriostatic) or causing death (bacteriocidal) of other microorganisms in low concentrations. Thus, they are medicines used in the prevention and treatment of bacterial, fungal, and some protozoal infections.[2] Major diseases, like syphilis, gonorrhoea, leprosy, and tuberculosis, lost much of their sting. The risk of death from something as common as streptococcal sore throat or a child's scratched knee virtually vanished. The powerful impact of these medicines sparked a revolution in the discovery of new drugs. The human condition took a dramatic turn for the better, with significant jumps in life expectancy.

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Antibiotics are the most frequently prescribed drugs, but they are often misused.[3,4] This contributes to the spread of resistant strains of bacteria. The emergence of antibiotic resistance is an evolutionary process that is based on selection for organisms that have enhanced ability to survive doses of antibiotics that would have previously been lethal.[5] Thus, antibiotics resistances occur when DNA sequence of bacteria changes in response to the use of these medicines. Bacteria, not humans, become antibiotic resistant. These bacteria may then infect humans and are harder to treat than non-resistant bacteria.[5] Common forms of antibiotic misuse include failure to take into account the patient's weight and history of prior antibiotic use while prescribing, since both can strongly affect the efficacy of an antibiotic prescription, failure to take the entire prescribed course of the antibiotic, failure to prescribe or take the course of treatment at fairly precise correct daily intervals, or failure to rest for sufficient recovery to allow clearance of the infecting organism. Antibiotic resistance has been described by the World Health Organization as a major global health problem that threats our ability to treat common infectious diseases and needs urgent action. Also, antibiotic resistance leads to longer hospital stay, higher medical cost, and increased mortality.[6–9] This is largely because of wrong prescribing behavior among physicians and wrong habit and lack of awareness among patients.[10–19] In addition, a number of studies have found gaps in public knowledge about antibiotics.[20–22] In countries without standard treatment guidelines, antibiotics are often overprescribed by health workers or prescribed for indications in which their use is not warranted, an incorrect or sub-optimal antibiotic is prescribed or in some cases for infections likely to resolve without treatment,[10,11] or antibiotics can be bought without a prescription, emergence and spread of resistance is made worse. Between 20% and 50% of antibiotic use is either unnecessary or inappropriate.[23,24]

Recently, the first "World Antibiotic Awareness Week" was held from 16 to 22 November 2015. The campaign was aimed to increase the awareness of global antibiotic resistance and to encourage best practices among the general public, health workers, and policy makers to avoid the further emergence and spread of antibiotic resistance. The theme of the campaign was "Antibiotics: Handle with Care", which reflects the overarching message that antibiotics are a precious resource and should be preserved. This highlights seriousness of antibiotic resistance and its control.

The improper and excessive use of antibiotics has resulted in the emergence of highly resistant bacteria. In underdeveloped countries with political instability like Nepal, antibiotics are excessively prescribed and can be obtained easily at any pharmaceutical shops without any physicians prescriptions. Aside from patients' concept and expectations,[25] knowledge acquired by healthcare professionals is a major factor with regard to the prescription of antibiotics. The ocean of knowledge, healthcare professionals have in relation to the rational use of antibiotics, is most important in spreading the message within the communities. A healthcare professional or healthcare professional student undergoes excessive training in the form of academic and clinical practice to be able to prescribe and educate about rational use of antibiotics. Health professional students are future generation of the healthcare system and they are one of the pillars of this system. Their beliefs, attitudes, and behavior regarding the use of antibiotics have a tremendous impact on the consequences associated with such uses in Nepal. They being easy to mould should be made aware to focus on the social aspects of antibiotic management especially the knowledge, attitude and practice so that in future they can aware and help the general population regarding the judicious use of antibiotics. Thus, based on the above, for the first time in Nepal this study was undertaken to assess the knowledge, attitudes, and practices of health professional students of Birgunj, Nepal towards the use of antibiotics in the treatment and antibiotic resistance.

Material and Methods

This was an institutional-based cross-sectional study conducted at two different health institutions located at Parsa district of Nepal. The study was conducted in between September 2015 to November 2015. A total of 176 respondents from Nursing and Dental backgrounds were included in this study. Bachelor in dental surgery students of second year as well as Bachelor of nursing science students of first year along with proficient certificate level of nursing students of first, second, and third years were included in this study. All our participants were females and male participants of dental students were excluded as more than 95% of our population was females. The participants who were present on the study day were included in this study, thus 176 participants were interviewed. The data were collected through the convenient sampling technique via self-administered pre-tested questionnaire. The research protocol was approved by the concerned departments of M.B. Kedia Dental College and Teaching Hospital, Tribhuwan University, Nepal as well as Nursing Campus-Birgunj, Tribhuvan University, Nepal. Written informed consent was obtained from each study participant prior to inclusion in the study.

Statistics

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16. Descriptive analysis was used to find out the knowledge, attitudes, and practices of antibiotics and their resistances. Statistical significant was defined as *P*-value <0.05.

Results

The respondents were between the ages 15 and 24 years. Among participants, about two-third (73.9%) belonged to proficient college level, whereas, 10.8% were first year students of Bachelor in Nursing Science and 15.3% were second year students of Bachelor in Dental Surgery. Table 1 shows participants' knowledge on etiology of antibiotic resistance. About

half (50.6%) of the respondents said the use of antibiotics for self-limited non-bacterial infections is one of the important factors of antibiotic resistance. Table 2 shows respondents' knowledge on antibiotics. More than two-third (90.9%) of respondents said that antibiotics cure bacterial infection. Knowledge on antibiotic cure bacterial infection was significantly associated with education level (*P*-value <0.02). Table 3 shows respondents' attitudes on antibiotics. Nearby 70% of respondents said that there is misuse of antibiotics. Table 4 shows respondents' perception on antibiotic use whereas Table 5 represents practice of antibiotics use among healthcare professional students. They were also asked on the mechanism of spread of antibiotic resistance bacteria to human beings. About 8.18% (*n* = 171) respondents reported that antibiotic resistant bacteria can spread to humans through contact with a person who has an antibiotic-resistant bacterial infection, whereas 9.35% (*n* = 171) respondents said that it can spread through contact with things that are touched by a person who has an antibiotic-resistant infection (e.g. instruments in a healthcare facility with poor hygiene). However, 21.63% (*n* = 171) respondents said that it can spread through contact with a live animal, food, or water-carrying antibiotic-resistant bacteria. Interestingly, 60.81% (*n* = 171) respondents agreed with all three mechanisms mentioned above by which antibiotics resistance bacterial infection can spread. "Mechanism of spread of antibiotic-resistant bacteria to human beings" was significantly associated with the age and education level (*P*-value <0.01 and *P*-value <0.04, respectively). If respondents get antibiotic resistance infection then 47.7% of them said that they will have to consult doctor or get treatment in hospital, 1.7% of them said that they will get sick for longer, and 2.8% of them said that they may need more expensive medicines. Surprisingly, only 33% respondents said that they will follow all three above-mentioned methods to cure antibiotic-resistant infection. About 83.5% respondents said that antibiotic resistance is already out of control and they can do something to control it. Turning to their attitude, 87.5% respondents said they want to consult doctor before starting antibiotics. However, 49.4% respondents prefer to take antibiotics when they have cough and sore throat. Also, 96.6% respondents check expiry date of antibiotics before using it. According to 84.7% of respondents indiscriminate and

Table 1: Respondents knowledge on aetiology of antibiotic (*n* = 176)

Causes of antibiotic resistance	Important	Unimportant	Unsure
Use of antibiotics for self-limited non-bacterial infections	89 (50.6)	48 (27.3)	39 (22.2)
Use of antibiotics with a broader than necessary spectrum	72 (40.9)	59 (33.5)	45 (25.6)
Use of antibiotics for shorter than standard duration	75 (42.6)	79 (44.9)	22 (12.5)
Poor infection control measures	93 (52.8)	50 (28.4)	33 (18.8)
Use of antibiotics for self-limited bacterial infections	114 (64.8)	48 (27.3)	14 (8.0)
Mutational and evolutionary changes in the micro organism	71 (40.3)	44 (25.0)	61 (34.7)
Lack of restrictions on antibiotic usage	82 (46.6)	64 (36.4)	30 (17.0)
Excessive antibiotic use in livestock (animals reared for food)	49 (27.8)	74 (42.0)	53 (30.1)
Use of antibiotics for longer than standard duration	69 (39.2)	92 (52.3)	15 (8.5)

Table 2: Respondents knowledge on antibiotic (*n* = 176)

Statements evaluating knowledge on antibiotic	*n* (%)		
	Yes	No	Don't know
Antibiotic cure bacterial infection	160 (90.9)	13 (7.4)	3 (1.7)
Antibiotic cure viral infection	53 (30.1)	107 (60.8)	16 (9.1)
Use of antibiotics will speed up the recovery of cold, cough	101 (57.4)	53 (30.1)	22 (12.5)
Antibacterial resistance means that if they are taken too often and will less likely work in future	119 (67.6)	35 (19.9)	22 (12.5)
Indiscriminate and injudicious use of antibiotic can lead to increased adverse effect	149 (84.7)	10 (5.7)	17 (9.7)
Indiscriminate and injudicious use of antibiotic can lead to additional burden of medical cost	106 (60.2)	43 (24.4)	27 (15.3)
Indiscriminate and injudicious use of antibiotic can lead to exacerbation or prolonged of illness	72 (40.9)	58 (33.0)	46 (26.1)
Frequent use of antibiotic will decrease efficacy of treatment when using the antibiotics again	114 (64.8)	45 (25.6)	17 (9.7)
Efficacy better, if antibiotic is new and costlier	34 (19.3)	110 (62.5)	32 (18.2)
Antibacterial resistance is serious global public health issue	124 (70.5)	27 (15.3)	25 (14.2)

Table 3: Respondents attitudes on antibiotic (*n* = 176)

Statements evaluating attitudes on antibiotics	*n* (%)		
	Yes	No	Don't know
There is abused of antibiotics	123 (69.9)	30 (17.0)	23 (13.1)
Abused of antibiotics, the main cause of bacterial infection	40 (22.7)	86 (48.9)	50 (28.4)
Antibiotic resistance affect health	134 (76.1)	31 (17.6)	11 (6.2)
Antibiotic resistance affect you and your family's health	76 (43.2)	73 (41.5)	27 (15.3)
There should be necessary to get more education about antibiotics	173 (98.3)	1 (0.6)	2 (1.1)
There should be need to establish course on rational use of antibiotics at university	169 (96.0)	3 (1.7)	4 (2.3)
There should be necessary to carry out large scale antibiotics campaign promotion	130 (73.9)	16 (9.1)	30 (17.0)

Table 4: Respondents perception of antibiotic use (*n* = 176)

Statements evaluating perception of antibiotics	*n* (%)				
	Strongly agree	Somewhat agree	Undecided	Somewhat disagree	Strongly disagree
Antibiotics are safe drugs; hence they can be commonly used medication	48 (27.3)	89 (50.6)	3 (1.7)	26 (14.8)	10 (5.7)
Skipping one or two doses does not contribute to the development of antibiotic resistance	45 (25.6)	37 (21.0)	39 (22.2)	24 (13.6)	31 (17.6)
Adverse effects of antibiotics are reduced by using more than one antibiotics at a time	20 (11.4)	29 (16.5)	57 (32.4)	26 (14.8)	44 (25.0)
Injudicious use of antibiotics shortens the duration of illness	19 (10.8)	50 (28.4)	35 (19.9)	31 (17.6)	41 (23.3)
When you have a cough and sore throat, antibiotics are the first drug of choice for early treatment and to prevent emergence of resistant strains	41 (23.3)	47 (26.7)	23 (13.1)	23 (13.1)	42 (23.9)

Table 5: Respondents practice of antibiotic use (*n* = 176)

Doctor prescribes a course of antibiotic for you. After taking 2–3 doses you start feeling better. Do you-	Always	Usually	Sometimes	Never
Stop taking the further treatment	10 (5.7)	22 (12.5)	55 (31.2)	89 (50.6)
Save the remaining antibiotics for the next time you get sick	14 (8.0)	20 (11.4)	43 (24.4)	99 (56.2)
Discard the remaining, leftover medication	17 (9.7)	24 (13.6)	67 (38.1)	68 (38.6)
Give the leftover antibiotics to your friend/roommate if they get sick	19 (10.8)	31 (17.6)	67 (38.1)	59 (33.5)
Complete the full course of treatment	109 (61.9)	29 (16.5)	26 (14.8)	12 (6.8)

injudicious usage of antibiotics can lead to increased adverse effect on human body. About 98.3% respondents suggested getting more education on antibiotics. Moreover, 61.9% of respondents completed full course of treatment while they were ill. Surprisingly, 19.69% of respondents were unsure about the causes of antibiotic resistance. Lastly, Table 6 represents the solution for the growing problem of antibiotic resistance suggested by healthcare professional students. They had focused more on awareness programs, rational use of antibiotics as well as consultation with the doctor to reduce and control antibiotic resistance.

Discussion

Antibiotic and its resistance is one of burning topics and needs focus by health professionals, general public as well as government to control the antibiotic resistance. Several studies across the globe had focused on it and included health professional, medical and non-medical students as well as general population including school teachers to access their knowledge, practice and usage of antibiotic and antibiotic resistance. However, this study was the first study conducted in Nepal. The result of this study may differ with other studies

Table 6: Respondents suggestion to control the growing problem of antibiotic resistance (*n* = 176)

Awareness and campaign program
Awareness and campaign program and, Consult doctor
Inclusion in curriculum
Rational use of antibiotics
Personal hygiene
Proper counseling by doctor
Development of new antibiotics
Adhere to full course of treatment.
Regulation of antibiotic sale
Research on antibiotic resistance
Government policy on antibiotic use
Use of broader spectrum antibiotics
Stop antibiotic use
Home remedy
Complete diagnosis and rational use of antibiotics

due to the selection criteria of participants, as only nursing and dental students were focused. Antibiotic is a precious drug and in last three decades no new antibiotic has been developed. Thus, it should be used with certain guidelines after the consultation of the doctor. However, due to its misuse, already antibiotic resistance has developed and therefore focus is required on new generations of health professionals along with non-health professionals to control antibiotic resistance.

In the present study, 87.5% of respondents want to consult doctor before starting antibiotics. Similar studies were conducted and they reported 92.8%,[26] 81.38%,[27] and 40.1%[28] of respondents want to consult doctor before starting antibiotics. In our study, it was found that 5.7% of respondents stop taking further treatment if they feel better after 2–3 doses of antibiotic treatment. Our finding compares with a study conducted in Manipur, India which they reported was 5.9%.[28] However, few of the studies reported higher percentage of participants stop taking further treatment if they felt better after 2–3 doses of antibiotic treatment.[26,29] In this study, abuse of antibiotic was reported by 69.9% of participants whereas a little bit high percentage (76.1%) was reported by a study conducted in 2014 at Manipur, India.[28] A two-third (76.1%) of respondents in our study said that antibiotic resistance affect health. However, it was found that a higher percentage (83.6%) of respondents said that antibiotic resistance affect health in a study conducted among medical students.[28] Among respondents, 60.8% of them said antibiotic do not cure viral infection. That is differ from other study finding in which 100%[30] and 81.9%[31] respondents said antibiotic do not cure viral infection. The statement "efficacy better, if antibiotic is new & costlier", is disagreed by 62.5% of respondents which is similar to the finding (58.1%) of Tarao.[28] Antibiotic is a serious health problems for all of us and thus one should work towards following the procedures to stop antibiotic resistance. It was found that 70.5% of respondents said antibiotic is a serious public health issue. In contrast, other studies reported 93.0%,[28] 96.51%,[26] and 90.7%[29] of participants felt that it is a serious public health issue.

This study indicated a need for further research at national level with inclusion of all sections of the community. Moreover, government should introduce and implement guidelines for the sale of antibiotics. Not only this but also, there should be guidelines on prescription and rational use of antibiotics in Nepal. Most importantly in view of students point, University board should include curriculum on antibiotics to enhance the future generation's knowledge, attitudes, and practices of antibiotics. In addition, interventions program too should be enforced to develop positive attitudes for the usage of antibiotics. Lastly, campaign and awareness, personal measure is required to reduce antibiotic resistance, and educate patients as well as general population on rational use of antibiotic.

Limitation

The limitation of this study was that only nursing and dental students were included in this study and conducted at a single district of Nepal. All health professional students at the national level should be included for this study could be a blue print for the government of Nepal.

Conclusion

The level of knowledge and attitude about antibiotic and antibiotic resistance of the health professional students is high; however, practice of antibiotic is still poor.

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