Original Research Article

CONSUMERS' AWARENESS REGARDING THE EFFECT OF ANTIBIOTIC USED IN ANIMAL FEED ON HUMAN HEALTH

ABSTRACT

The main aim of the study were to determine the consumers' awareness regarding the effect of antibiotics used in animal feed on human health and to explore relationship between the selected characteristics of the respondent consumers and their awareness. The study was conducted at Mohammad Nagar residential area under Batiaghata upazila of Khulna district and Nirala residential area of Khulna City Corporation, Khulna, Bangladesh following descriptive and diagnostic type of research design. Forty respondents from each of the residential areas were interviewed as the sample of the study and data were collected through personal interview method using an interview schedule by the researcher ~~herself during~~within/between January–February, 2019. Most (80%) of the respondents were highly aware while only one fifth (20%) of the respondents had medium awareness about the effect of antibiotics used in animal feed on human health. Consumers were highly aware ~~about~~ that resistance is grown in pathogenic organisms causing diseases in human body against antibiotics ~~which~~ that were~~are~~ used in patient treatment; thus, resulting in treatment failure. ~~But~~However, consumers were less aware about allergic reaction and painful rash, which are possible with many antibiotics. The mean awareness score of the consumers residing~~ed~~ at Nirala was higher than that of Mohammad Nagar residential area but it did not differ significantly. This might be due to proximity of the two residential areas. Among ten selected characteristics of the respondents; education, family education, annual family income, exposure to communication media, nutritional knowledge, animal protein consumption behavior and attitude showed positive significant relationship with their awareness regarding the effect of antibiotic used in animal feed on human health. Consumers in the study area are concerned about the effect of antibiotics used in animal feed on human health.

Key Words: Consumers' awareness, antibiotic, animal feed, human health.

1. INTRODUCTION

Human health is directly related to the environment and in particular the nature and quality of food (Reference). Quality of food from animal products is gaining concern from ~~widely concerning~~ public health agencies around the world since antibiotics and veterinary drugs have played an important role in the field of animal husbandry and agro-industry. At present, the occurrences of residues in increasing form and resistance have become burning issues [1].

Antibiotics and veterinary medicinal products (VMPs) are crucial to meet the challenges of supplying sufficient quantity of food for the vast and fast growing world population as drugs

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improve the rate of weight gain, improve feed efficiency, prevent and treat diseases in food producing animals [2]. The safe and effective use of antibiotics in animal production has received considerable attention in most of the countries in the world [3]. Human health can either be affected by the residues of drugs in food of animal origin, which may cause direct side effects or indirectly through selection of antibiotic resistance bacteria that may spread to human [4, 5, 6]. Resistant microorganism can get access to human~~,~~ either by direct contact or indirectly through milk, meat, and egg. It is documented that drug resistant bacteria such as *Salmonella*, *Campylobacter* and *Staphylococcus* from food of animal origin were developed by human beings [5, 6].

In general, harmful effects of antibiotics and drugs residues on health, which may be mutagenic, carcinogenic, reduction in reproductive performance, drug allergy and acute toxicity or poisoning in human [1, 7, 8]. Drug low-level contamination generally may not generate a violation problem on human health. However, extensive use of drugs may increase the risk of an adverse effect of residues on the consumer including the occurrence of antibiotic resistance. In this study an attempt has been made to find out the effects of antibiotics used in animal feed on human health and how far the consumers are aware of this issue in the selected areas of Khulna district.

The study was conducted to fulfill the following objectives:

i. To analyze the selected characteristics of the consumers.
ii. To determine consumers' awareness regarding the effect of antibiotics used in animal feed on human health.
iii. To explore relationships between the selected characteristics of the consumers and their extent of awareness regarding the effect of antibiotics used in animal feed on human health.

2. MATERIALS AND METHODS

2.1 Design and Locale of the Study

The present study was a descriptive and diagnostic type of research. It was designed to study consumers' awareness regarding the effect of antibiotics used in animal feed on human health. The study was based on collection of data by door to door interviewing of the respondents. The study was conducted at Mohammad Nagar residential area under Batiaghata upazila of Khulna district and Nirala residential area of Khulna City Corporation, Khulna, Bangladesh.

2.2 Population and Sampling

All the household heads of Mohammed Nagar and Nirala residential areas of Khulna were considered as the population of the study. Forty family heads from each of the residential areas were interviewed as the sample of the study. Thus, the sample size stood 80.

2.3 Data Collection and Processing

~~-~~The primary data were collected ~~by the researcher herself~~ through ~~face to face~~face-to-face interview ~~using interview schedule during~~between/within January–February, 2019. Reviewing related studies, the ~~researcher~~ authors considered some of the selected characters of the respondents as independent variables for the study. The characteristics were age, educational qualification, family size, family education, annual income, exposure to communication media,

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nutritional knowledge, animal protein consumption behavior, training exposure and attitude towards antibiotics used in animal feed. Consumers' awareness regarding the effect of antibiotics used in animal feed on human health was considered as dependent variable in this study.

All qualitative data were converted into quantitative form by means of applying some appropriate scoring technique. In several instances, indices and scales were constructed through the simple accumulation of score assigned to individual or pattern of attributes.

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2.3.1Measurement of Selected Characteristics (Independent Variables)

The measurement of selected characteristics (independent variables) is shown in Table 1.

Table 1. Measurement of selected characteristics (independent variables)

Selected characteristics (independent variables)	Measuring Unit
Age	Actual year
Educational qualification	Years of schooling
Family size	Number
Family education	Years of schooling
Annual income	'000'BDT
Exposure to communication media	Score
Nutritional knowledge	Score
Animal protein consumption behavior	Score
Training exposure	Score
Attitude	Score (following Likert scale)

Comment [JNJ8]: I doubt if this could really serve. It is better you use a score. How is it to be differentiated with family education?

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2.3.2 Measurement of Consumers' Awareness (Dependent Variable)

To determine consumers' awareness, five (5) statements related to the effects of antibiotics used in animal feed on human health were incorporated in the interview schedule. To determine the awareness score of the respondents a five point rating scale such as strongly agree, agree, undecided, disagree and strongly disagree were employed against the five (5) statements and a score of 5, 4, 3, 2 and 1 was employed against the scales respectively. The awareness score of a respondent would range from 5 to 25, where '5' indicate low awareness and '25' indicate high awareness. Based on awareness score, the respondents were categorized into three groups as low awareness (≤ 8), medium awareness (9-16) and high awareness (>16). To compare among statements, an awareness index (AI) was calculated using following formula:

$$AI = N_{sag} \times 5 + N_{ag} \times 4 + N_{ud} \times 3 + N_{da} \times 2 + N_{sda} \times 1$$

Where,

AI = Awareness Index

N_{sag} = Number of respondents rated the impact as strongly agree

N_{ag} = Number of respondents rated the impact as agree

N_{ud} = Number of respondents rated the impact as undecided

N_{da}= Number of respondents rated the impact as disagree

N_{sda}= Number of respondents rated the impact as strongly disagree

The awareness index (AI) score weould range from 80-400 where 80 indicates low awareness and 400 indicates high awareness on a particular statement regarding the effect of antibiotics used in animal feed on human health.

For better understanding of the relative position of the statement, the AI score was converted to percentage using following formula:

$$\% \text{ AI} = \frac{\text{Observed AI Score}}{\text{Highest Possible AI Score}} \times 100$$

2.4 Data Analysis

Data were compiled, tabulated and analyzed based on the objectives of the study. Different statistical treatments such as number, mean, standard deviation, range, minimum, maximum, rank order and percentage were used to describe the variables. To explore relationship between ~~any two~~ variables, Pearson Product and Spearman Rank Correlation Coefficients ~~(for interval and ratio type of data) and in some cases Spearman Rank Correlation Coefficient (for ordinal type of data)~~ were used. Data analysis was done using the ~~concerned software~~ Statistical Package for Social Science (SPSS) 20.

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3. RESULTS AND DISCUSSION

3.1 Facts on the Selected Characteristics of the Consumers (Respondents)

Data presented in Table 2 indicate that majority (51.3%) of the respondents were~~as~~ young ~~aged~~ and highest proportion (41.3%) of the respondents had secondary level of education. Highest proportion (45%) of the respondents' family had secondary level of education followed by higher secondary (27.5%) and graduate (25%). Majority (70%) of the respondents had small sized family, belonged to high income group (57.5%), had medium exposure to communication media (72.5%), had medium nutritional knowledge (61.3%) and consumed high amount of animal protein (62.5%). Most (90%) of the respondents did not receive any training on human health especially the effects of antibiotics used in animal feed on human health and had moderately favorable attitude(80%).

Table 2. Distribution of the respondents according to their selected characteristics (N=80)

Selected Characteristics	Categories	Score	Respondents (N=80)		Mean	SD	Range	
			Number	Percentage			Min.	Max.
Age (Years)	Young aged	≤ 35	41	51.3	38.08	12.85	16	70
	Middle aged	36-50	24	30				
	Old aged	> 50	15	18.8				
Education (Years of schooling)	Illiterate	0	0	0	12.34	3.61	1	17
	Primary	1-5	3	3.8				
	Secondary	6-10	33	41.3				
	Higher Secondary	11-12	10	12.5				
	Graduate	13-16	18	22.5				
	Post graduate	>16	16	20				
Family size	Small	1-4	56	70				

(No. of members)	Medium	5-6	22	27.5	4.2	0.97	2	7
	Large	≥7	2	2.5				
Family education (Years of schooling)	Illiterate	0	0	0	10.21	2.69	3	15.5
	Primary	1-5	2	2.5				
	Secondary	6-10	36	45				
	Higher secondary	11-12	22	27.5				
	Graduate	13-16	20	25				
	Post graduate	>16						
Annual family income (BDT "000")	Low income	≤200	3	3.8	422.93	185.07	180	960
	Medium income	201-350	31	38.8				
	High income	>350	46	57.5				
Exposure to communication media (score)	No Exposure	0	0	0	14.63	3.94	6	23
	Low exposure	1-9	10	12.5				
	Medium exposure	10-18	58	72.5				
	High exposure	>18	12	15				
Nutritional knowledge (score)	No knowledge	0	0	0	8.84	3.05	2.5	16
	Poor knowledge	Up to 6	20	25				
	Medium knowledge	7-12	49	61.3				
	High knowledge	13-18	11	13.8				
Animal protein consumption behavior (score)	Low consumption	1-5	2	2.5	10.61	2.07	4	14
	Medium consumption	6-10	28	35				
	High consumption	>10	50	62.5				
Training exposure	Yes		8	10				
	No		72	90				
Attitude (score)	Less favorable	≤ 10	1	1.3	17.7	3.31	10	28
	Moderately favorable	11-20	64	80				
	High favorable	21-30	15	18.8				

Table 3. Rank order of sources of animal protein based on animal protein consumption index

Source of animal protein	APCI		Rank order
	Score	Percentage	
Egg	204	85%	2nd
Milk	195	81.25%	3rd
Chicken	210	87.5%	1st
Beef	143	59.58%	4th
Mutton	96	40%	5th

**APCI= Animal protein consumption index

Among the sources of animal protein, chicken ranked 1st (APCI= 210, percentage= 87.5%) compared to other sources of animal protein and mutton ranked last (APCI=96, percentage=40%). This might be due to the low and high market price of chicken and mutton, respectively.

3.2 Consumers' Awareness regarding the Effect of Antibiotics Used in Animal Feed on Human Health

The computed scores of awareness of the respondents ranged from 14 to 24 with mean and standard deviation of 18.93 and 2.63 respectively. According to the scores on awareness, the respondents were distributed into three groups as shown in Table 4.

Table 4. Distribution of the respondents according to their awareness

Categories	Score	Respondents (N=80)		Mean	Standard Deviation	Range	
		Number	Percentage			Min.	Max.
Low awareness	≤ 8	0	0				
Medium awareness	9-16	16	20.0	18.93	2.63	14	24
High awareness	> 16	64	80.0				

Most (80%) of the respondents were highly aware about the effect of antibiotics used in animal feed on human health. Only one--fifth (20%) of the respondents had medium awareness about the effect of antibiotics used in animal feed on human health (Table 4). Therefore, it is clear that, all the respondents were more or less aware about the effect of antibiotics used in animal feed on human health. The findings of the present study have harmony with the findings of Mallick and Mondol [9]. They conducted a study on farmers' awareness regarding deforestation at Jalma union of Batiaghata upazila under Khulna district of Bangladesh.

Table 5. Rank order of the statements related to antibiotics used in animal feed and their effect on human health based on Awareness Index (AI)

Sl. No.	Statements	AI*		Rank Order
		Score	Percentage	
1.	Resistance grow against the antibiotics which are used in patient treatment	327	81.75%	1st
2.	Some antibiotics can cause stomach upset and other gastrointestinal side effect	286	71.5%	4th
3.	Allergic reaction and painful rash are possible with many antibiotics	271	67.75%	5th
4.	Some antibiotics may cause cancer.	320	80.00%	2nd
5.	Many antibiotics may adversely affect human fertility	307	76.75%	3rd

** AI= Awareness Index

Data presented in Table 5 indicate that consumers were highly aware about ~~that~~ the resistance that is grown against antibiotics which are used in patient treatment (AI=327, rank= 1st). ~~But~~However, consumers were less aware ~~about~~ that allergic reaction and painful rash are possible with many antibiotics (AI=271, rank= 5th).

The mean awareness score of the consumers residinged at Nirala residential area (x=19.65) was higher than that of the Mohammad Nagar residential area (x=18.2). ButNevertheless, it did not differ significantly (t=1.99). This might be due to proximity of the two residential areas.

3.3 Relationship between the Selected Characteristics of the Respondents and Their Awareness Regarding the Effect of Antibiotic Used in Animal Feed on Human Health

The purpose of this section is to determine the relationships of the selected characteristics of the respondents with their awareness regarding the effect of antibiotics used in animal feed on human health. The selected characteristics of the farmers included: age, educational qualification, family size, family education, exposure to communication media, nutritional knowledge, animal protein consumption behavior and attitude towards antibiotic used in animal feed. Each of the above characteristics constituted an independent variable while consumers' awareness regarding the effect of antibiotic used in animal feed on human health was the only dependent variable in this study. Relationships of the nine selected characteristics of the respondents with their awareness have been presented in the Table 6.

Table 6. Correlation between the selected characteristics of the respondents and their awareness regarding the effect of antibiotic used in animal feed on human health

Independent variable (selected characteristics)	Dependent variable (focus variable)	Correlation coefficient	Remark
Age	Consumers' awareness regarding the effect of antibiotic used in animal feed on human health	0.055 NS	PPCC
Education		0.520**	PPCC
Family size		-0.147 NS	PPCC
Family education		0.419**	PPCC
Annual family income		0.426**	PPCC
Communication media exposure		0.619**	SRCC
Nutritional knowledge		0.725**	PPCC
Animal protein consumption behavior		0.310**	SRCC
Attitude		0.663**	SRCC

NS= Non-significant, **Correlation highly significant at 1% level of probability and *Correlation highly significant at 5% level of probability, PPCC = Pearson's Product Moment co-efficient of correlation, SRCC = Spearman Rank Correlation Coefficient.

Among the selected characteristics of the respondents; education, family education, annual family income, exposure to communication media, nutritional knowledge, animal protein consumption behavior and attitude showed positive significant relationship with their awareness regarding the effect of antibiotics used in animal feed on human health. It means that education, family education, annual family income, exposure to communication media, nutritional knowledge, animal protein consumption behavior and attitude increase awareness of consumers also increases. Similar results were also found bySultana *et al.* [10]Sultana et al. [10] also found

similar results regarding age. The findings of the studies conducted by Hasan [11], Shanto [12] and Khatun [13] have harmony with the present study regarding educational qualification. Similar result was described by Hasan [11], Hoque [14] and Mallick and Mondol [9] regarding family size. The findings of the studies conducted by Hasan [11] Shanto [12] and Khatun [13] have similarity with the present study regarding annual family income. Hasan [11] and Shanto [12] observed similar result regarding exposure to communication media. The findings of the studies conducted by Hoque [14], Hasan [11] and Jalal [15] have harmony with the present study regarding knowledge.

4. CONCLUSION

~~Based on the finding of the study and its' logical interpretation it can be concluded that most of the respondents were highly aware about the effect of antibiotic used in animal feed on human health. Only one fifth of the respondents had medium awareness about the effect of antibiotic used in animal feed on human health. Consumers were highly aware about that resistance is grown in pathogenic organisms causing diseases in human body against antibiotics which are used in patient treatment resulting in treatment failure. But consumers were less aware about allergic reaction and painful rash which are possible with many antibiotics. The mean awareness score of the consumers resided at Nirala residential area was higher than that of the Mohammad Nagar residential area but it did not differ significantly. This might be due to proximity of the two residential areas. Among the selected characteristics of the respondents; education, family education, annual family income, exposure to communication media, nutritional knowledge, animal protein consumption behavior and attitude showed positive significant relationship with their awareness regarding the effect of antibiotic used in animal feed on human health.~~ In pursuit of the findings and observations, it is clear that the consumers in the study area are concerned about the effect of antibiotic used in animal feed on human health. Government and the producer should develop new strategies for a prudent use of antibiotics in food producing animals to ensure food safety.

Comment [JNJ12]: Scientific interpretation of the findings is necessary.

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