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A Pilot Survey on the Use of Antimicrobal Agents in Poultry Farms in Kerala

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Authors' contributions

This work was carried out in collaboration among all authors. Author SS carried out the literature survey and interview. Author AAT carried out the analysis and interpretation of data. Authors JAB and MJ participated in revising the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The extent of usage of antimicrobials is expected to increase markedly over coming years due to intensification of farming practices in most of the developing countries. The main aim of the study was to assess the pattern of farming practices and antibiotic use in the selected poultry farms in the Muvattupuzha region of the state of Kerala, India. A semi-structured interview was conducted among the farmers of the twelve randomly selected poultry farms. The use of antimicrobials for various purposes like treatment and prevention of infections, growth promotion, etc. was reported by 67% of farmers. Commonly used antibiotics were ofloxacin, enrofloxacin, levofloxacin, tetracycline, ceftriaxone, ciprofloxacin, oxytetracycline, neomycin sulphate, colistin. The survey concluded that none of the farmers were trained in poultry farming and they simply followed the instructions given by their supervisors who are also not aware of the consequences of improper farming practices. They used to give antibiotics for prevention and treatment of infections in chicken without the advice from a veterinarian and they used to get antibiotics from pharmacy shops and other shops without any prescriptions. Most of the farms surveyed were following the poultry recommendations and maintaining cleanliness which was enough to prevent outbreak of infections. Spread of mild infections can be prevented by isolating the sick poultry rather than giving antibiotic

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to the entire batch. Most of the farmers were aware of the presence of antibiotics as growth promoters in poultry feed and they prefer to use that for the tremendous increase of the weight of poultry.

Keywords: Antimicrobials; irrational use; poultry; resistance; farmers; misuse.

1. INTRODUCTION

Poultry is one of the world's fastest growing sources of meat. The modern poultry production can produce market ready broiler chickens in less than six weeks [1]. Chicken is the common farmed species, with over 90 billion tons of chicken meat produced per year [2]. Chickens are kept either as a 'breeding flock' or as a 'broiler flock' for human consumption [3]. The newly developed animal production practises are associated with regular use of antimicrobials [4].

Antimicrobials use in animal production dates far back to 1910. Due to the shortage of meat products, workers carried out protest and riots across America. Scientist at that time started looking for means of producing more meat at relatively cheaper costs; research works on that idea resulted in the use of antibiotics and other antimicrobial agents [2].

Small doses of antibiotic in poultry could increase the rate of weight gain. The feed efficiency of animals was first noted in the 1940s and though the exact mechanism is not well understood. Today more antibiotics are used worldwide in poultry, swine and cattle production compared to human population [5]. With respect to consumption of antimicrobials in food animals, the global consumption was estimated to be 63151 units in 2010; India accounts for 3% of the global consumption of antibiotics and is the fourth highest in the world, behind china (23%) the united states (13%) and brazil (9%). The consumption of antimicrobials in the food animal sector in India is expected to double by 2030 [6]. Often the quantity of antibiotics given is not under the farmers control, due to premixed antibiotics contained in the feed they purchase. According to studies, in India, 70percent of antibiotics are used in poultry are for growth promotion, while the remaining 30 percent are for therapeutic purposes [7]. Data compiled by CSE states that of 15 common agents used as AGPs in Indian chicken feed, 11 are considered by WHO to be important, highly important or critically important for human health and all are banned for agricultural use in the European union [8,9].

The main reasons for the use of antibiotics in food producing animals include

- Growth promotion use of antimicrobials
- Disease prevention use (or prophylactic use) of antimicrobials
- Treatment use (or therapeutic use) of antimicrobials [10-13].

In recent years, enough evidence highlighting a link between excessive use of antimicrobial agents and antimicrobial resistance from animals as a contributing factor to the overall burden of antibiotic resistance has emerged [8]. The extent of usage of antimicrobials is expected to increase markedly over coming years due to intensification of farming practices in most of the developing countries [14,15]. The main aim of the study was to assess the use of antimicrobial agentsin broiler poultry farms selected for the study.

2. METHODOLOGY

2.1 Study Site

This cross-sectional study was carried out among the farmers in the twelve randomly selected broiler poultry farms from the six selected areas of the Muvattupuzha region of the state of Kerala, India.

Semi-structured interview was conducted to collect information on antimicrobial use in farms with the aid of a questionnaire prepared and validated for the purpose.

2.2 Data Analysis

Data was analysed using Microsoft Excel, SPSS software (version 18.0: SPSS Inc< Chicago, IL).

3. RESULTS

A questionnaire containing 26 questions was prepared, validated and conducted a 30 minute structured interview among farmers of the selected poultry farms. The questions were based on the demographics, farm operations and

antibiotic use pattern in the farms. The size of these twelve poultry farms was in the range 2000 to 4000sq.ft with a shed size range from 1000 to 4000 sq. ft. Approximate number of birds in each shed of the farm was in the range of 1200 to 3800 with an average of 2775 birds in each farm. The in-charge of the farm operations in all farms was the farm owners themselves and none of them got any training in poultry farming. The survey opens that the antimicrobials are widely used in the poultry farms; the reason for the use differs from farm to farm. Out of the twelve farmers who participated in the survey, 8 (67%) farmers used antimicrobials routinely in their farms and 4 (33%) farmers never used antibiotics (Table 1). Only four (33%) of the farmers responded that they gave antibiotics to promote the growth of chickens while the remaining eight (67%) responded that they gave antibiotics to promote the growth of chickens and prevent and treat infections as listed in Table 2. The antimicrobial agents frequently used by the farmers include ofloxacin, enrofloxacin, levofloxacin, oxytetracycline, ceftriaxone, cephalexin, neomycin, colistin. Hygeine maintainence is a major concern among farmers (Table 4). Unhygenic conditions will leads to frequent illness and premature death of the birds. 50% farmers used lime wash to maintain hygiene in the poultry sheds. Disinfectants were used by 26% farmer and 8% farmers used combination methods. The responses are given below in Table 3. Maintenance charge also determines the choice of the mode of hygiene. 25% of respondents told that antibiotics were more affordable, 33% reported as hygiene and sanitisation measures are more affordable. 42% reported that both methods were useful for preventing animal disease. Prevention of infection in poultry is guaranteed through hygiene as well as vaccinations. All farmers participated in the survey reported that they use vaccines in the poultry.

As antimicrobials has greater place in the poultry sector it is important to know whether the farmers are getting these under proper guidance. We interviewed the farmers about the purchase and supply of antibiotics and 73% of farmers purchased from their poultry owners or their supervisors and it is surprising that none of them had undergone any training in the proper use of antibiotics. Rest of them purchased from pharmacies and veterinarians as showed in Fig. 1. So the information regarding the use was given by either the supervisor or seller in most of the cases and none of the sellers provides all the information. Only two farmers (17%) reported that they got all the information about the use of antibiotics Three farmers (25%) responded that seller gave information only on ‘duration’ of antibiotics; two other farmers (17%) got information on only ’dosage’ of antibiotics and one farmer (8%) used to get information only on ‘mode of administration’ of antibiotic use. 33% of farmers responded that seller gave information on dosage, route, duration and mode of administration of antibiotics as showed in Fig. 2.

Table 1. Response of use of antibiotic in poultry farm

Details of response (n=12)	
Antibiotics given	**Not given**
Farm 1	Farm 3
Farm 2	Farm 6
Farm 4	Farm 7
Farm 5	Farm 10
Farm 8	-----
Farm 9	-----
Farm 11	-----
Farm 12	----

Table 2. Reason for using antibiotics

Details of responses (n=12)		
Promote growth of chickens	**Treat infections**	**Prevent infections**
All 12 farms	Farm 6, Farm 7, Farm 8, Farm 10	Farm 1, Farm 2, Farm 7, Farm 9, Farm 11

Table 3. Choice of method for preventing infection

Farms	Response
Farm 1	Lime wash
Farm 2	Lime wash
Farm 3	Lime wash, others
Farm 4	Disinfectants
Farm 5	Lime wash
Farm 6	Disinfectants
Farm 7	Lime wash
Farm 8	Lime wash
Farm 9	Lime wash, Disinfectants, Combination
Farm 10	Lime wash
Farm 11	Disinfectants, Fumigation
Farm 12	Disinfectants

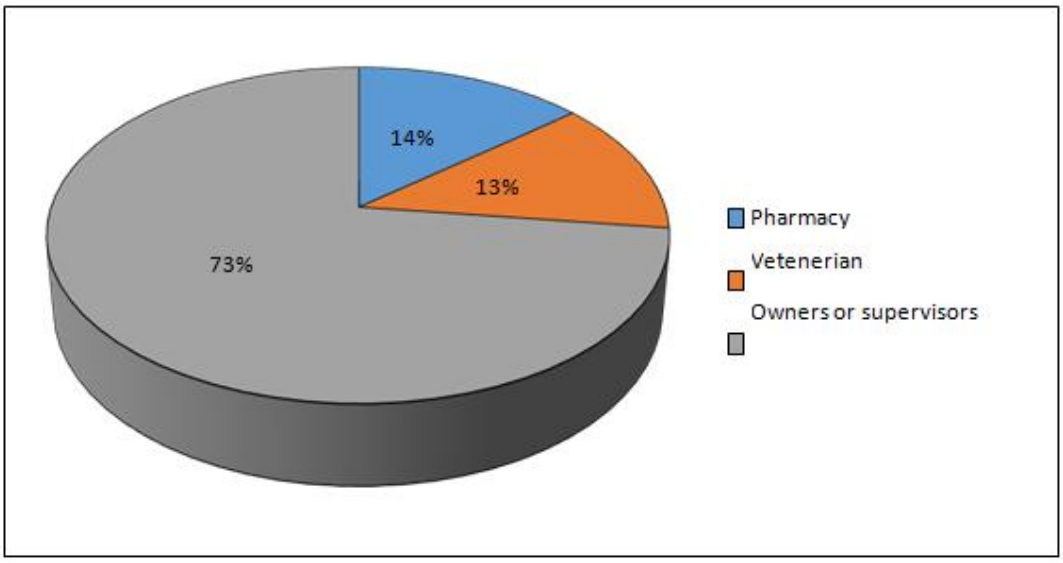

Fig. 1. Choice of buying antibiotic

4. DISCUSSION

Our survey highlights a wide use of antibiotics in the poultry farms and the reason for use differs in each farm. The abundant use of antibiotics may be mainly due to lack of proper training and less knowledge regarding the use and harmful effects of irrational use antibiotics. Some of the farmers use antibiotics as a disinfectant as they found that they are cost effective and can also used to prevent diseases. Surprisingly according to some antibiotics helps in promoting growth which opens the door to its wide use.

Most of the farms surveyed in the study was of medium size. The number of chickens kept in each shed in the farms should be limited since overcrowding may lead to spread of infection which may necessitate the need for use of more antibiotics. The number of chickens kept in each shed in each farm was within the limit in this study and therefore the overcrowding might not act as a reason for spread of infection in poultry.

All farmers reported that they removed the droppings from shed only after the sale of one batch of poultry approximately 45 days. Also farmers did the cleaning process by using each of the methods such as lime wash, disinfectants, fumigation and combination of different methods. The farmers did these types of cleaning methods only after the sale of all chickens 45 days, the development time taken for the raise of chicken and they waited 1 week for the cleaning and drying process before introduction of a new batch. So during the 45 day time period there was chance for

the occurrence of infections in the farm. All farmers used to isolate sick chickens to prevent the spread of disease to other healthy chickens.

Table 4. Pattern of antibiotic or vaccine using in poultry farm

Farms	Drugs/Vaccines Routinely Given to Chickens	Dose, Duration, Frequency &Route
FARM 1	Ofloxacin	1st 2-3 days as eye drops
	Enrofloxacin	After 1st week 2-3 days in drinking water. Also whenever poultry is found sick
	Attenuated New Castle Disease virus strain EID-50 Vaccine	7th day as eye drops
FARM 2	Newcastle Disease B1 type,B1 strain Live Virus Vaccine	7th day given through eyes, 14th day and 21st day 1 vial in 1Litre of drinking water.
FARM 3	Enrofloxacin 10% oral solution	In 1 Litre water whenever poultry is found sick
FARM 4	Levofloxacin	7th day on drinking water whenever poultry is found sick
	Enrofloxacin HCl 3%,Ciprofloxacin HCl 7%,Colistin sulphate 0.25% buffered with folic acid	In 1 Litre water whenever poultry is found sick
FARM 5	Levofloxacin plus bromoxineHCl)	2 ml in 1L water Q6H for 4 days whenever poultry is found sick
	Attenuated New Castle Disease virus strain EID-50 Vaccine	7th day as eye drops
FARM 6	Ceftriaxone solution 0.5% (Ceftriaxone Na 500 mg	500mg in 5 ml, when needed 5 ml mixed with 20L of water whenever poultry is found sick
FARM 7	Attenuated New Castle Disease virus strain EID-50 Vaccine IP Bursal disease Intermediate plus type Live IP	6th day as eye drops,12th and 21st day in drinking water
FARM 8	Attenuated New Castle Disease virus strain EID-50 Vaccine	7th day as eye drops
	Colistin	On 3rd day 4.5ml/L or 1ml/L whenever poultry is found sick
	Neomycinsulphate, Oxytetracyclin, Vitamin A	3g in 10L of water for 500 chickens whenever poultry is found sick
FARM 9	Cephalexin oral powder	Once daily,20g in 45L water for 2000 chickens from 7th to 14th days whenever poultry is found sick
	Enrofloxacin	Whenever poultry is found sick
	Albendazole	Whenever poultry is found sick
FARM 10	Attenuated New Castle Disease virus strain EID-50 Vaccine Live Bursal disease virus Vaccine	7th day as eye drops
	Levofloxacin	Whenever poultry is found sick
FARM 11	Cephalexin Oral powder	20g in 30L water, Twice daily
	Oxytetracycline	500g in 10L water for 5 days
	Attenuated New Castle Disease virus strain EID-50 Vaccine	7th day as eye drops
FARM 12	Attenuated New Castle Disease virus strain EID-50 Vaccine	7th day as eye drops

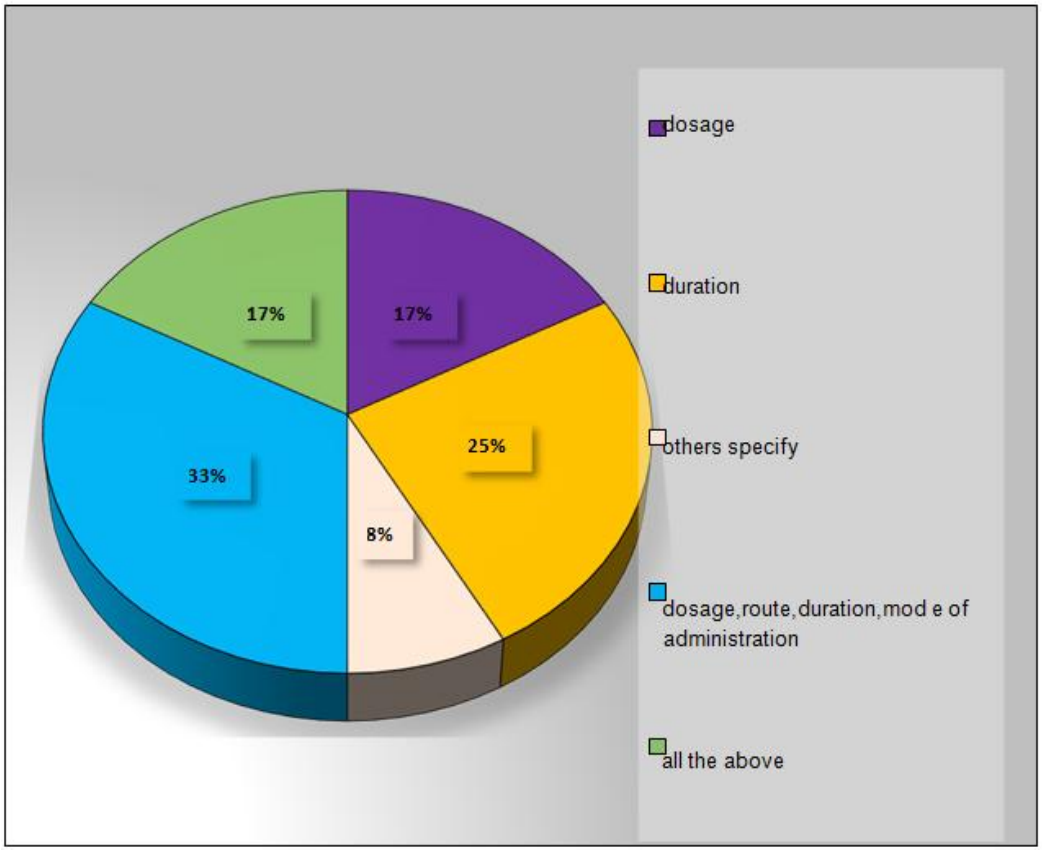

Fig. 2. Details about the way of using the drug in poultry

About 8 (67%) out of 12 farmers participated in the survey reported the use of antimicrobials for various purposes like treatment and prevention of infections, growth promotion, etc. Commonly used antibiotics were ofloxacin, enrofloxacin, levofloxacin, tetracycline, ceftriaxone, ciprofloxacin, oxytetracycline, neomycin sulphate, colistin, etc. The studies by Adelowo et al and Laube et al also reported a similar list of antibiotics used regularly on the farms for animal health management in Nigeria and Germany [16,17]. The rapid global rise of Escherichia coli infections that are resistant to therapeutically important antimicrobials, including first-line drugs such as cephalosporin's and fluoro quinolones, is serious concern [18,19]. Even then banned antibiotics like colistin are widely using as growth promoter and disease prevention agent in Kerala. 33% farmers responded antibiotics made chickens grow faster this may due to use of antibiotics for entire fattening period. In a similar study by Laube et al reported use of antibiotic for entire fattening period. 32% farmers were sure that antibiotics made chickens grow faster [16]. Only 25% of the farmers used to take the advice from veterinarian before giving antibiotics and the rest use their previous experience, advice from friends, other farmers and pharmacists for treating infections in poultry. Only 33% farmers told that they used to collect information from seller about the dosage, route, duration and mode of administration of antibiotics. None of the farmers got any training in poultry farming. In the present study, only one farmer used to keep records of drug use in poultry. The same scenario was reported by Olawale et al in their study [17]. Only 50% of farmers were aware of antibiotic growth promoters included in the poultry feed. 25% farmers gave the opinion that the use of antimicrobials were more effective and economical than hygiene or sanitation measures because labourers in poultry farms were not skilful to ensure that all hygiene procedures.

All these points to the it is necessity ofdeveloping and implementing national plan on restricting (ban/phase off) use of critically important antibiotics. Also there should be stringent

measures to monitor the implementation of such a plan to curb the menace of irrational use of life-saving antibiotics in animals/agriculture [20].

5. CONCLUSION

The reason for the presence of extensively drug resistant E. coli in the poultry environment may be due to the irrational use of antibiotics in poultry farms for prevention and treatment of infections and growth promotion which was revealed from the survey conducted. The survey concluded that none of the farmers were trained in poultry farming and they used to give antibiotics for prevention and treatment of infections in chicken without the advice from a veterinarian. Most of the farmers were aware of the presence of antibiotics as growth promoters in poultry feed and they prefer to use that for the tremendous increase of the weight of poultry.

CONSENT

Informed consent was also taken from the farmers before participating in the survey.

ETHICAL APPROVAL

Ethical clearance was obtained from the Institutional Ethics Committee of the investigator's institution.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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