

Review on Antimicrobial Resistance Pattern of Similar Antibiotics Used for *Escherichia Coli* and *Salmonella* Spp. in Bangladesh with Public Health Significance

ABSTRACT

Antimicrobial resistance (AMR) is a major health threat for humans and animals around the world. Different classes of antibiotics are frequently used to treat human, poultry, and livestock diseases in Bangladesh. *Escherichia coli* and *Salmonella* spp. cause gastrointestinal illness in humans and animals. Since they have zoonotic potential, their antibiotic resistance genes may transfer both horizontally and vertically. Human, poultry, and livestock excreta and their environment are excellent sources of pathogenic bacteria. Therefore, *E. coli* and *Salmonella* infections in humans and animals are frequently found here, causing huge economic losses. To treat this type of infection, similar generic antibiotics are used indiscriminately in humans, poultry, and livestock. In this study, different types of antibiotics like ampicillin, ceftriaxone, ciprofloxacin, gentamicin, erythromycin, azithromycin, tetracycline, sulphamethoxazole-trimethoprim, and colistin were found to have higher levels of resistance against *E. coli* and *Salmonella* spp. Due to a higher level of resistance, two or three types of antibiotic combinations are used today to check bacterial infections that increase the medicinal burden. It is high time to combat AMR infections by raising public awareness, and the government should implement a national action policy to combat illegal antibiotic use.

Keywords: AMR; *E. coli*; *Salmonella*; zoonotic; humans; poultry; livestock.

1. INTRODUCTION

The issue of antimicrobial resistance (AMR) affects public health worldwide [1, 2]. AMR increases the number of deaths and hospitalizations while also increasing medical costs [1]. It also affects the poultry and livestock sectors simultaneously [3,4]. Each year, AMR is responsible for hundreds of thousands of fatalities [5]. AMR is predicted to cause around 10 million yearly deaths worldwide by the year 2050 [6]. According to the WHO, AMR is among the top 10 worldwide public health hazards to humanity [7,8]. According to World Bank estimations, with modest AMR impacts, the world's annual gross domestic product (GDP) will probably decline by 1.1% by 2050, while in a high AMR adverse situation, the global GDP would fall by 3.8% by 2050, with an annual shortfall of 3.4 trillion US dollar by 2030 [9]. AMR would also result in greater economic growth declines in least developed countries than in developed countries, increasing economic disparity across nations [10]. The highest AMR effect scenario projects a probable 11% reduction in livestock productivity in low-income nations by 2050 [9].

E. coli is often found in the gastrointestinal tracts of humans and animals. *E. coli* strains are not commonly detrimental. But some strains such as Shiga toxin-producing *E. coli* (STEC), can cause severe foodborne diseases. Around the world, 20% of cases of foodborne diseases are caused by *E. coli* O157:H7 [11]. Salmonellosis is an ordinary bacterial disease condition which is responsible for gastrointestinal illness. *Salmonella* spp. generally lives in the intestines of humans and animals and is shed in feces. CDC reported that *Salmonella* generates 1.35 million illnesses, 26,500 hospital admissions, and 420 human deaths annually in the US [12]. Both *E. coli* and *Salmonella* spp. have zoonotic significance and cause severe production losses in dairy and poultry [3,4].

Different classes of antibiotics have been widely used for the treatment of *E. coli* and *Salmonella* infections for decades. Antibiotics are becoming less effective due to their vast indiscriminate use. That's why several studies have been carried out on AMR for various bacterial species in humans, poultry, and livestock from time to time in Bangladesh. This study is designed to look into the use of similar kinds of antibiotics and their resistant patterns in humans, poultry, and livestock.

2. MATERIAL AND METHODS

We utilized the databases Google, Google Scholar, Pubmed, and ResearchGate for a search of pertinent literature on similar antibiotics used in humans, poultry, and livestock in Bangladesh. The keywords used to search databases were "AMR of *E. coli* and *Salmonella* in humans, poultry, and livestock from 2010 to 2022 in Bangladesh" and "AMR of *E. coli* and *Salmonella* in different divisions of Bangladesh;" "AMR of *E.*

coli and *Salmonella* in Bangladesh for livestock production;" "Antibiotic-resistant" or "antimicrobial-resistant" in poultry farming in Bangladesh. We also searched for AMR situations in hospital patients, chickens, and ruminants in Bangladesh. AMR of *E. coli* and *Salmonella* spp. in humans, poultry, and livestock around the world is also observed for the global burden and situation of AMR. We used Microsoft Word and Excel (MS-2013) for data curation and analysis.

3. SOURCE AND TRANSMISSION

3.1 *E. coli*

The main reservoir for *E. coli* transmission is cattle [4]. Similarly, other livestock like sheep and goats are considered to be significant hosts, and some vertebrates including poultry, pigs, and horses, have also been detected as transport hosts [2, 11]. Humans are infected with *E. coli* O157: H7 and are often brought on by consuming contaminated foods such as uncooked meat or unpasteurized milk [11]. Cross-contamination with beef and other animal foods during cooking, diseased surfaces, and dirty kitchen tools are some ways that infection can happen. Another risk factor is fecal contamination of food, drink, and other sources [4].

3.2 *Salmonella* spp.

Salmonella can be transmitted by food animals like chickens, pigs, and cattle [2, 4, 13]. It is also found in birds, reptiles, and turtles, as well as in pets like cats and dogs [13]. *Salmonella* may go up the food web from feedstuffs through primary production to homes, catering, and other locations where food is served [2]. Salmonellosis is most commonly transmitted in humans by consuming untreated water and contaminated foods of livestock origin [13]. It is also feasible for humans to transmit salmonellosis indirectly. [14]. Pet owners who come into contact with diseased animals may also get sick [13].

4. SIMILAR ANTIBIOTICS USED IN HUMAN, POULTRY AND LIVESTOCK

Antibiotics are drugs used to treat bacterial infections in both humans and animals [15]. Globally, different classes of antibiotics are used for the treatment of *E. coli* and *Salmonella* infections in humans, poultry, and livestock [16,17]. Several studies have been reported that penicillins, cephalosporins, quinolones, aminoglycosides, macrolides, tetracyclines, sulfonamides, and other classes of similar antibiotics are frequently used to treat *E. coli* infections in humans, poultry, and livestock in Bangladesh [Table 1].

Table 1. List of similar antibiotics used in humans, poultry, and livestock in Bangladesh

Class of antibiotics	Name of Antibiotics	References
Penicillins	i) Ampicillin	[18-26]
	ii) Amoxicillin	
Cephalosporins	i) Cephalexin	[17, 18, 23, 27-29]
	ii) Ceftriaxone	
Quinolones	i) Ciprofloxacin	[16, 18, 20, 24, 26, 28, 30-35]
	ii) Levofloxacin	
	iii) Norfloxacin	
	iv) Nalidixic Acid	
Aminoglycosides	i) Gentamicin	[18, 23, 36]
Macrolides	i) Erythromycin	[4, 22, 23, 28, 33, 37, 38]
	ii) Azithromycin	

Tetracyclines	i) Tetracycline	[4, 16, 18, 19, 32, 38-40]
	ii) Doxycycline	
Phenicols	i) Chloramphenicol	[4, 24, 33]
Sulphonamides	i) Sulphamethoxazole	[17, 20, 36, 41]
Polymyxins	i) Colistin	[3, 27, 42]

5. RESISTANT PATTERN OF *E. COLI* AND *SALMONELLA* SPP.

Antimicrobial resistance of *E. coli* and *Salmonella* spp. have become an alarming issue that is being encountered more frequently worldwide in both veterinary and human medicine. *Salmonella* and *E. coli* species have a strong potential to acquire resistance genes, despite the fact that all therapeutically significant antimicrobial medicines are fundamentally sensitive to them. In the case of *E. coli*, mostly through horizontal gene transfer [43], but for Salmonellosis, both horizontal and vertical transmission occur [2]. Table 2 represents the resistance pattern of similar antibiotics used for *E. coli* and *Salmonella* spp. infection in humans, poultry, and livestock in Bangladesh.

5.1 Resistance to Penicillins

Antibiotics from various classes are frequently used to treat *E. coli* and *Salmonella* infection. Ampicillin and amoxicillin are members of the β -lactam class of antibiotics which generally kill numerous bacterial pathogens [2]. In Bangladesh, ampicillin showed 87% to 100% resistance to *E. coli* and 100% to *Salmonella* from hospital patient samples, poultry, and cattle samples, respectively. Manhique-Coutinho et al. [70] reported 97.8% ampicillin resistant to *E. coli* from diarrheic children in Mozambique and 91% ampicillin resistance to *Salmonella* Typhimurium in China [71]. Racewicz et al. [72] detected 100% ampicillin resistance to *E. coli* from poultry in Poland, whereas 95.4% resistance was found from livestock in the UAE [73]. On the other hand, Elmadiena et al. [74] reported 90.60% ampicillin resistant to *Salmonella* from humans and animals in Sudan. Figure 1 shows resistance of ampicillin to *E. coli* and *Salmonella*, where 100% resistance was observed in the case of *Salmonella* among humans, poultry, and livestock in Bangladesh.

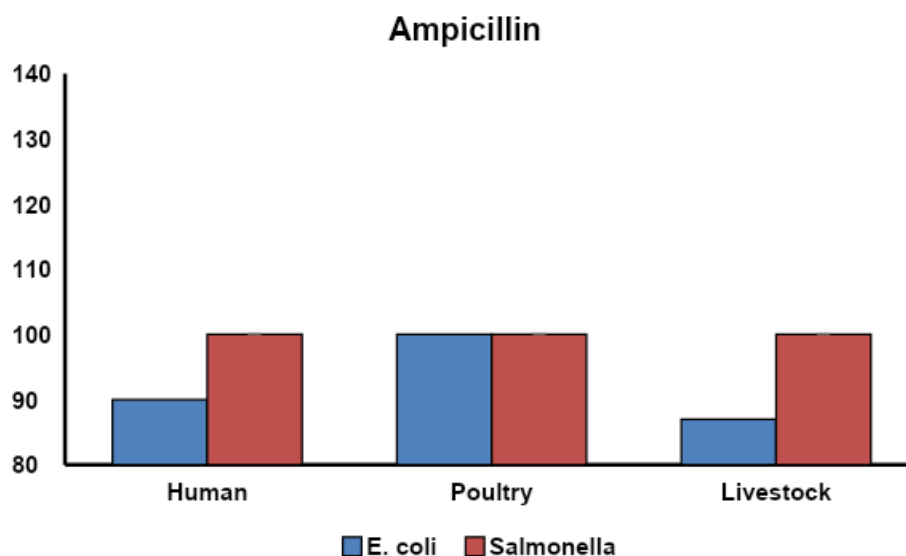


Fig. 1: Pattern of ampicillin resistance in Bangladesh

Amoxicillin found 74% to 100% resistant to *E. coli* and 16% to 100% resistant to *Salmonella* from human, poultry, and dairy samples in Bangladesh. Wu et al. [75] reported 85% amoxicillin resistance to *E. coli* from neonates in China. Abbassi et al. [76] showed 57% amoxicillin resistance to *E. coli* from livestock in

Tunisia, whereas 95% in diarrheic calves in Chile [77]. On the other hand, Garbaj et al. [78] found 100% *Salmonella* resistant amoxicillin from dairy products in Libya. Figure 2 represents resistance of amoxicillin to *E. coli* and *Salmonella*, whereas 100% resistance was noticed in both *E. coli* and *Salmonella* in poultry in Bangladesh. Similarly, Amoxicillin resistance in livestock was also significantly high. Long-term use of penicillin drugs in humans and animal therapeutics may result in higher detection of resistance against *E. coli* and *Salmonella* spp.

Table 2. Resistance pattern of similar antibiotics used for *E. coli* and *Salmonella* spp. in Bangladesh.

Antibiotic Class	Name of Antibiotics	Resistant Percentage for <i>E. coli</i>			References	Resistant Percentage for <i>Salmonella</i> spp.			References
		Human	Poultry	Livestock		Human	Poultry	Livestock	
Penicillins	Ampicillin	90	100	87	[18-22, 24-26]	100	100	100	[44-47]
	Amoxicillin	74	100	90	[18, 21, 23, 26]	16	100	100	[18, 48-50]
Cephalosporins	Cephalexin	84.1	100	53.8	[17, 23, 27]	06	65	71.4	[17, 18, 51]
	Ceftriaxone	63	69.24	21.79	[18, 28, 29]	03	96.42	33	[18, 52, 53]
Quinolones	Ciprofloxacin	61	100	22.1	[18, 28, 30, 31]	94	100	31.57	[18, 54, 55]
	Levofloxacin	54.3	81.6	14.8	[18, 31, 32]	25	50	9.1	[53, 56, 57]
	Norfloxacin	39	50	16.32	[24, 33, 34]	23	20	21.42	[18, 51, 58]
	Nalidixic Acid	85.9	100	86	[16, 20, 26, 35]	100	100	100	[44, 45, 59-62]
Aminoglycosides	Gentamicin	30	100	100	[18, 23, 36]	02	86.70	6.62	[4, 18, 54]
Macrolides	Erythromycin	98	100	88.89	[4, 22, 23, 37, 38]	87	100	100	[39, 45, 50, 55, 59, 63-65]
	Azithromycin	49	76.93	100	[4, 28, 33]	100	81.25	100	[4, 45, 60]
Tetracyclines	Tetracycline	56	100	89.44	[4, 18, 19, 37, 38]	15	100	86.76	[4, 18, 39, 48, 51, 59, 64, 66]
Phenicols	Doxycycline	61.1	78.1	28.57	[16, 32, 39]	7	79.31	26.66	[18, 61, 65]
	Chloramphenicol	40	97.2	33.89	[4, 24, 33]	20.8	94.28	76	[16, 47, 67]
Sulphonamides and Trimethoprim	Sulphamethoxazole-trimethoprim	78.1	100	100	[17, 20, 37, 41]	29.4	76.83	81.48	[3, 16, 19, 68]
Polymyxins	Colistin	2.9	48.84	15.9	[3, 27, 42]	19.54	60	89.47	[46, 55, 69]

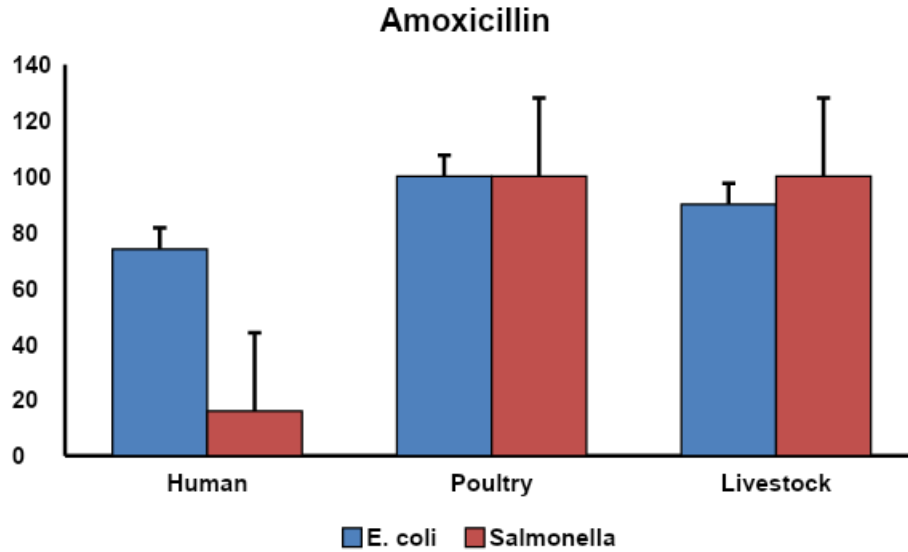


Fig. 2: Pattern of amoxicillin resistance in Bangladesh

5.2 Resistance to cephalosporins

Cephalexin is the first generation and ceftriaxone is the third generation cephalosporin, which are widely used to treat numerous diseases of humans, poultry, and livestock [16,17]. In this review, we found 53.8% to 100% cephalalexin resistant and 21.79% to 69.24% ceftriaxone resistance were observed in *E. coli* samples from humans, poultry, and ruminants. Recently, Eezzeldin et al. [79] reported 90.6% cephalalexin and 72% ceftriaxone resistance to *E. coli* from soba hospital samples in Sudan. On the other hand, Manishimwe et al. [80] found 56.8% ceftriaxone resistance to *E. coli* samples from dairy cattle in the USA. Figure 3 represents resistance of cephalalexin to *E. coli* and *Salmonella*, where 100% resistance was observed in salmonellosis in poultry in Bangladesh. In humans, 84.1% of cephalalexin-resistant *E. coli* was also alarming.

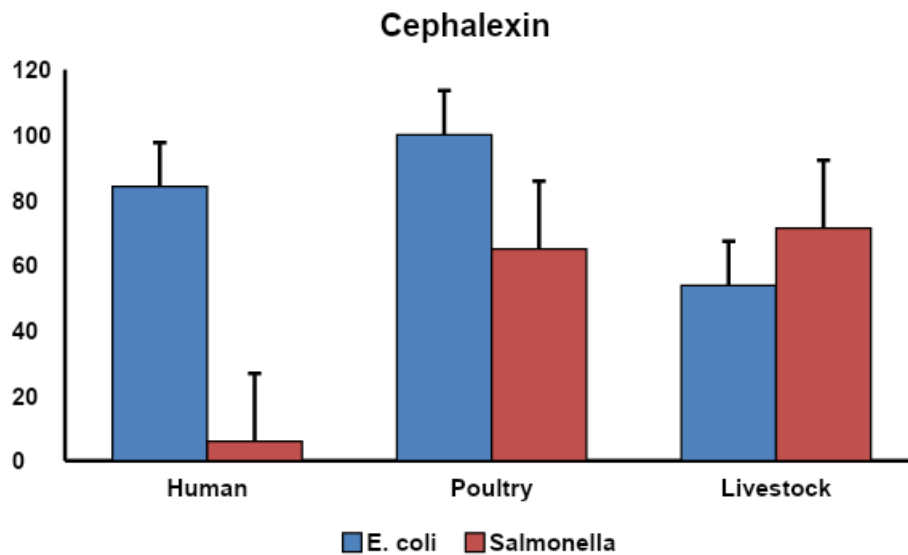


Fig. 3: Pattern of cephalalexin resistance in Bangladesh

About 6% to 71.4% cephalexin resistance and 3% to 96.42% ceftriaxone resistance were found against salmonellosis in humans and animals in Bangladesh. Elmadiena et al. [74] found 50% cephalexin resistant to *Salmonella* from humans and animals in Sudan. On the other hand, Oneko et al. [81] reported 56.5% ceftriaxone resistant against *Salmonella* in Kenya. Figure 4 represents resistance of ceftriaxone to *E. coli* and *Salmonella*, where highest resistance was noticed in salmonellosis in poultry in Bangladesh. These results highlight the urgent requirement for an improved drug monitoring system in Bangladesh.

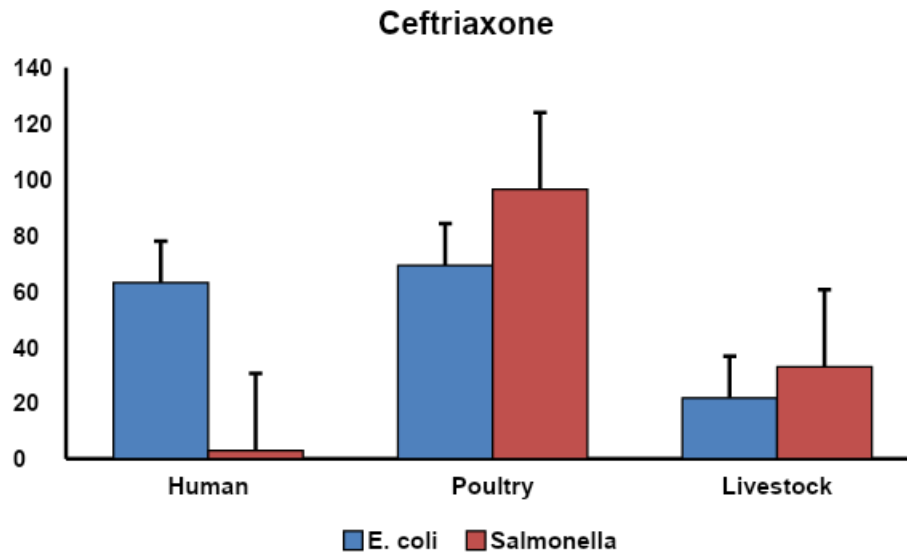


Fig. 4: Pattern of ceftriaxone resistance in Bangladesh

5.3 Resistance to Quinolones

Quinolone a class of antibiotics that is widely used for the treatment of bacterial infections. Fluoroquinolone antimicrobials like ciprofloxacin, levofloxacin, norfloxacin, and nalidixic acid are often used to treat a variety of illnesses in people, poultry, and animals [2]. In this study, we observed 22.1% to 100% ciprofloxacin resistance to *E. coli* and 31.57% to 100% ciprofloxacin resistance to *Salmonella* in humans, poultry, and livestock in Bangladesh. Recently, Eezzeldin et al. [79], Koju et al. [82], and Samy et al. [83] found 68%, 66%, and 50.8% resistance to ciprofloxacin against *E. coli* from humans, poultry, and livestock samples in Sudan, Nepal, and Egypt, respectively. *Salmonella* found 75% ciprofloxacin resistant from human and broiler isolates in Colombia [84]. Qamar et al. [85] reported 31% ciprofloxacin resistance from raw milk samples in Pakistan. Figure 5 shows resistance of ciprofloxacin to *E. coli* and *Salmonella*, where 100% resistance was noticed in both *E. coli* and *Salmonella* in poultry in Bangladesh. In humans, 94% of ciprofloxacin-resistant *Salmonella* detection was also significant.

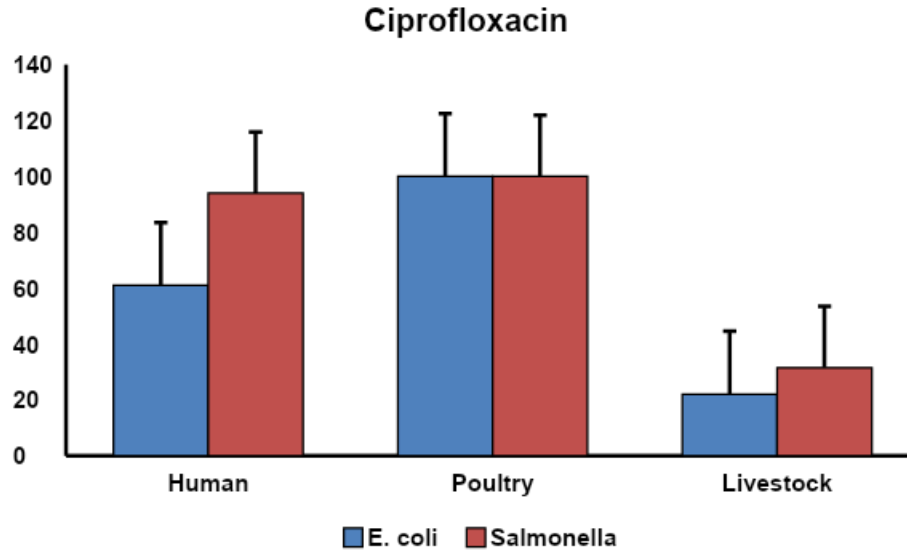


Fig. 5: Pattern of ciprofloxacin resistance in Bangladesh

Levofloxacin found 54.3%, 81.6%, and 14.8% resistant to *E. coli*, whereas norfloxacin observed 39%, 50%, and 16.32% resistant to *E. coli* from human, poultry, and livestock samples in Bangladesh. In Colombia, Herrera-Sánchez et al. [84] found 57.1% levofloxacin-resistant *Salmonella* in human and broiler isolates. Nalidixic acid (NA) is another kind of quinolone antibiotic which is generally used to treat infections. In this study, we found 86% to 100% NA resistance to *E. coli* and *Salmonella* from various isolates of humans, poultry, and animals. Vuthy et al. [86] reported 91% *E. coli* resistant and 92% *Salmonella* spp. resistant NA from chicken samples in Cambodia. On the other hand, 77.3% of NA-resistant *E. coli* detected from fecal isolates of dairy cattle in Texas [80]. Figure 6 shows resistance of NA to *E. coli* and *Salmonella*, where 100% resistance was observed in the case of *Salmonella* among humans, poultry, and livestock in Bangladesh. These findings should serve as a warning regarding the rigorous application of fluoroquinolones in humans, birds, and animals.

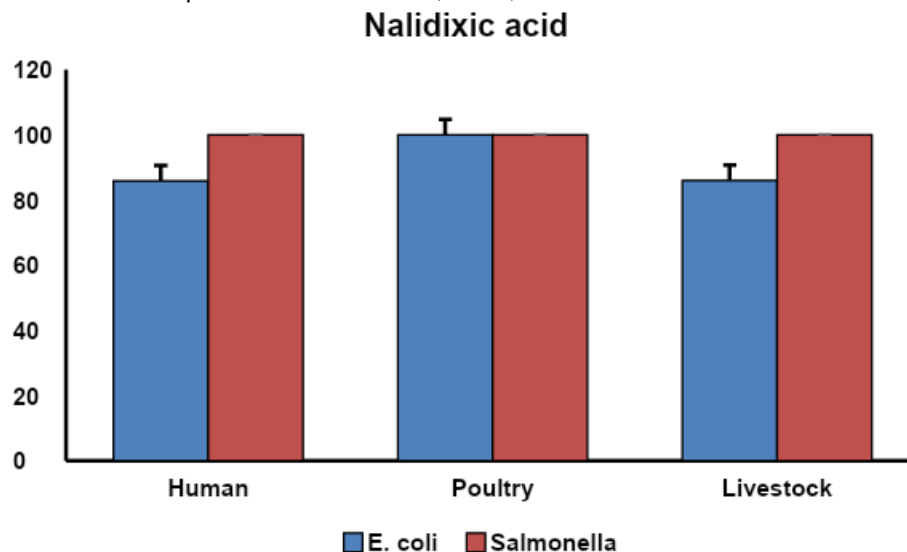


Fig. 6: Pattern of nalidixic acid resistance in Bangladesh

5.4 Resistance to Aminoglycosides

Aminoglycoside antibiotics inhibit the production of bacterial protein [87]. One of the most common aminoglycoside antibiotics used in human and animal medicine is gentamicin. In this study, we observed 30% to 100% gentamicin resistant to *E. coli* and 2% to 86.70% resistant to *Salmonella* from human, poultry, and livestock samples in Bangladesh. Recently, García-Béjar et al. [88] observed 79% resistance to gentamicin from *E. coli* samples in chicken samples in Spain. Abdelwahab et al. [73] also reported 85% resistance to gentamicin from *E. coli* isolates from ruminants in the UAE. In Pakistan, Wajid et al. [89] reported 64.70% gentamicin-resistant *S. Typhimurium* from poultry. The detection of higher resistance to gentamicin from animal samples is quite alarming. So, strict use of gentamicin for poultry production should be followed. Figure 7 represents resistance of gentamicin to *E. coli* and *Salmonella*, where higher resistance was noticed in *E. coli* in poultry and livestock in Bangladesh.

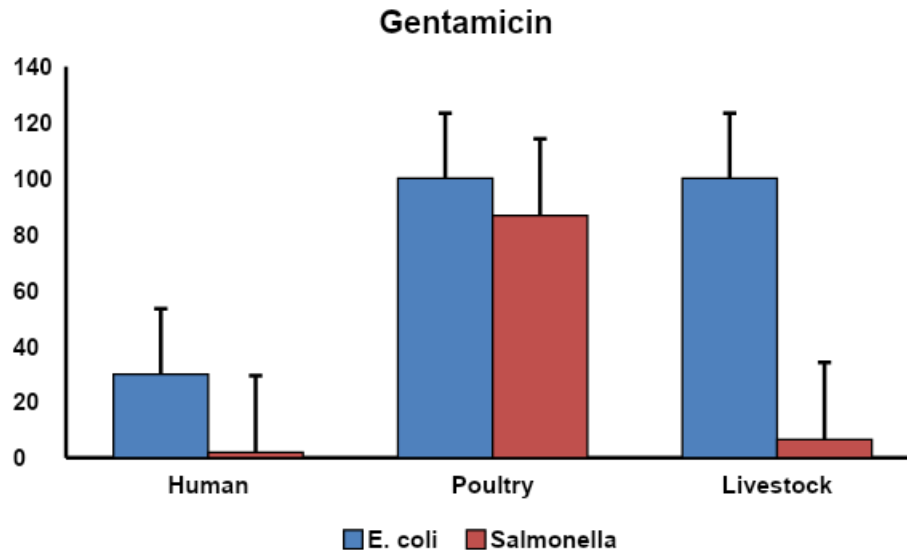


Fig. 7: Pattern of gentamicin resistance in Bangladesh

5.5 Resistance to Macrolides

Erythromycin and azithromycin are grouped into macrolides, where their main function is to restrict or inhibit bacterial growth rather than destroy it [90]. In Bangladesh, 88.89% to 100% erythromycin-resistant *E. coli* and 87% to 100% erythromycin-resistant *Salmonella* were observed from human, poultry, and livestock isolates. Kibret et al. [91] found 89.4% resistance to erythromycin against *E. coli* from human isolates in Ethiopia. Recently, Ranasinghe et al. [92] also reported 80.84% resistance of *E. coli* to erythromycin from poultry samples in Sri Lanka. Ramatla et al. [93] observed 89.3% erythromycin-resistant *Salmonella* from human and livestock isolates in South Africa. Sharma et al. [94] and Cardoso et al. [95] also noticed 100% resistant to *Salmonella* against erythromycin in India and Brazil, respectively. Adzitey et al. [96] found 86% erythromycin-resistant *Salmonella* from dairy cattle in Ghana. Figure 8 represents resistance of erythromycin to *E. coli* and *Salmonella*, where higher resistance was observed in all cases of humans, poultry, and livestock.

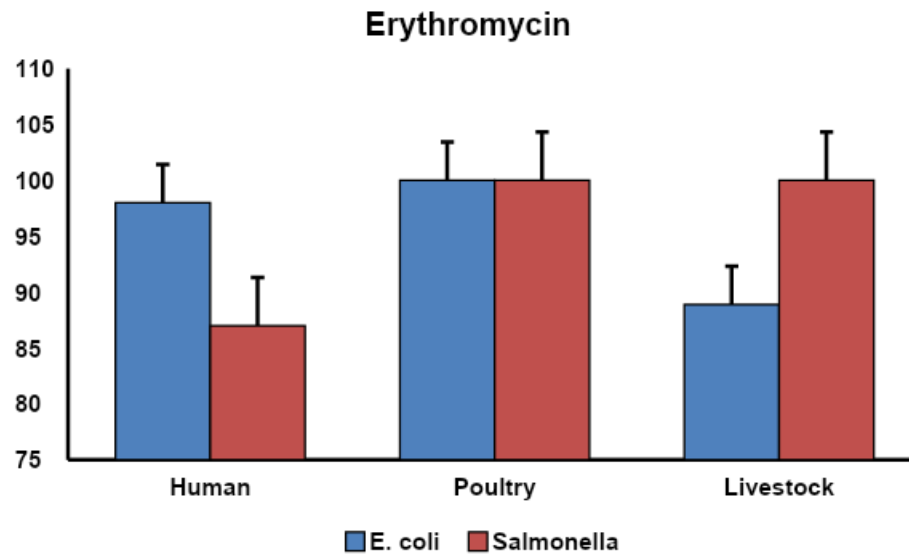
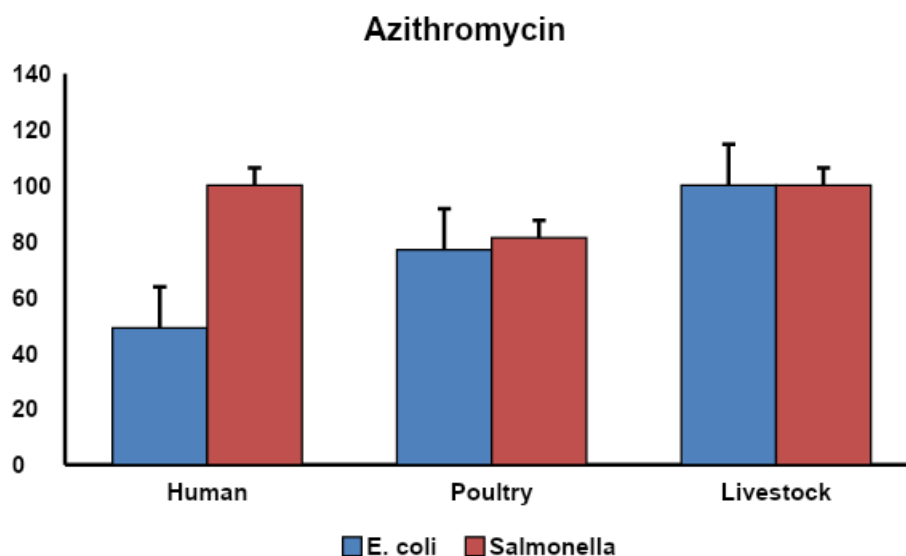


Fig. 8: Pattern of erythromycin resistance in Bangladesh

In this study, we found 49% to 100% azithromycin-resistant *E. coli* and 81.25% to 100% azithromycin-resistant *Salmonella* isolates from human and animal samples. Xiang et al. [97] reported 86.7% azithromycin-resistant *E. coli* from hospital patients samples in China. On the other hand, Gupta et al. [98] also found 73.3% azithromycin-resistant *Salmonella* from human isolates in India. Figure 9 represents resistance of azithromycin to *E. coli* and *Salmonella*, where 100% resistance was noticed in both *E. coli* and *Salmonella* in livestock.

**Fig. 9: Pattern of azithromycin resistance in Bangladesh**

5.6 Resistance to Tetracyclines

Tetracycline and doxycycline are grouped in tetracyclines that are often used in human-animal medicine. In Bangladesh, 56% to 100% tetracycline-resistant *E. coli* and 15% to 100% tetracycline-resistant *Salmonella* were observed in humans, poultry, and ruminants. Wilkerson et al. [99] reported 52% and 98% tetracycline-resistant *E. coli* from human and bovine isolates, respectively. Koju et al. [82] also found 87.7% tetracycline-resistant *E. coli* from chicken samples in Nepal. On the other hand, Pavelquesi et al. [100] reported 70% tetracycline-resistant *Salmonella* in human and animal origin. Sharma et al. [94] also detected 100% resistance tetracycline-resistant *Salmonella* from chicken meat samples in India. Figure 10 shows resistance of tetracycline to *E. coli* and *Salmonella*, where 100% resistance was noticed in both *E. coli* and *Salmonella* in poultry. Livestock also remained in the upper position.

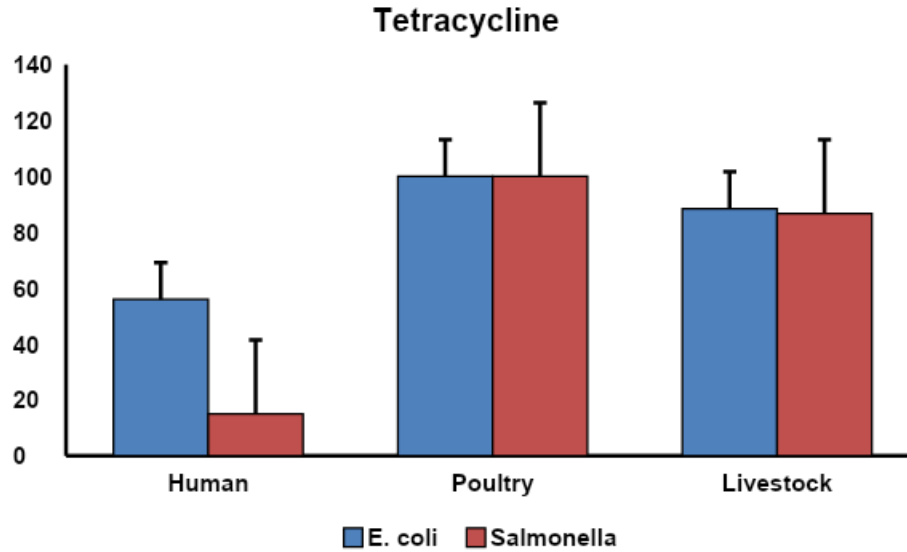


Fig. 10: Pattern of tetracycline resistance in Bangladesh

In this study, we found that more than 75% *E. coli* and *Salmonella* spp. isolated from poultry in Bangladesh were resistant to doxycycline. Racewicz [72] and Waghmare et al. [101] also reported *E. coli* and *Salmonella* as 100% resistant to doxycycline in China and India.

5.7 Resistance to Phenicol

Chloramphenicol is not presently used widely but sometimes used in a lower dose, which may be harmful to the hosts [102]. But it has long been used to treat a variety of bacterial illnesses in people and animals [2]. In this review, we found 33.89% to 97.2% chloramphenicol-resistant *E. coli* and 20.8% to 94.28% chloramphenicol-resistant *Salmonella* from human, chicken, and livestock samples in Bangladesh. Abbasi et al. [76] reported 53.4% chloramphenicol-resistant *E. coli* from livestock samples in Tunisia. Okoli et al. [103] also found 100% chloramphenicol-resistant *E. coli* from poultry isolates in Nigeria. Busani et al. [104] found 84% and El-Sharkawy et al. [105] reported 100% resistant to chloramphenicol against *Salmonella* from cattle and poultry isolates in Italy and Egypt, respectively. Figure 11 shows resistance of tetracycline to *E. coli* and *Salmonella*, where 100% resistance was noticed in both *E. coli* and *Salmonella* in poultry.

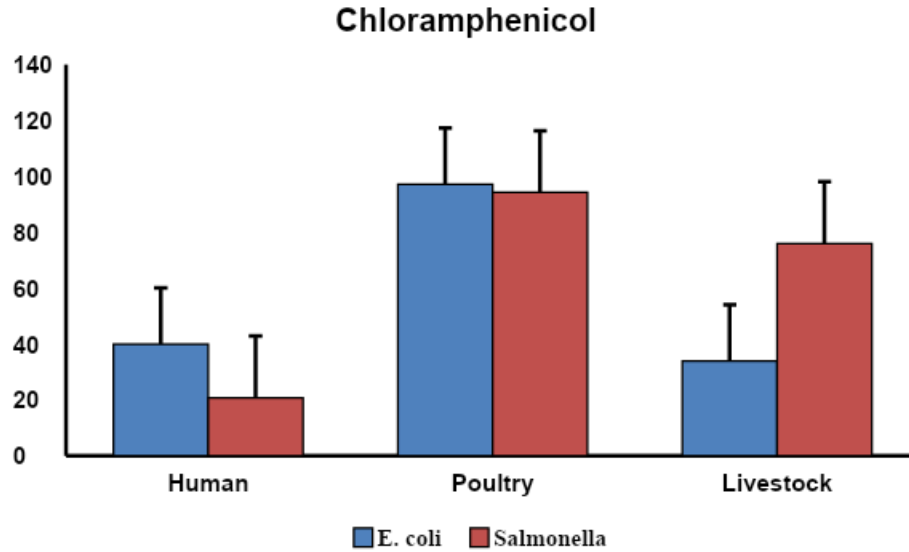


Fig. 11: Pattern of chloramphenicol resistance in Bangladesh

5.8 Resistance to Sulphonamides

The sulfamethoxazole component is a member of the sulfonamide drug class that acts as a bacteriostatic [2]. In this study, we observed 78.1% to 100% sulphamethoxazole-trimethoprim resistance in *E. coli* and 29.4% to 81.48% sulphamethoxazole-trimethoprim resistance in *Salmonella* from human, poultry, and livestock sample in Bangladesh. Bailey et al. [106] reported 71% sulphamethoxazole-trimethoprim resistant *E. coli* from hospital patient samples in the USA. Racewicz et al. [72] also reported 84% resistance of *E. coli* to sulfamethoxazole-trimethoprim from poultry samples in China. On the other hand, Nguyen et al. [107] detected 53.04% sulphamethoxazole-trimethoprim resistant *Salmonella* from poultry isolates in Vietnam. Dahshan et al. [108] also reported 100% sulphamethoxazole-trimethoprim resistant *Salmonella* from pigs in Japan. Figure 12 shows resistance of sulphamethoxazole-trimethoprim to *E. coli* and *Salmonella*, where higher resistance was noticed in both *E. coli* and *Salmonella* in poultry and livestock.

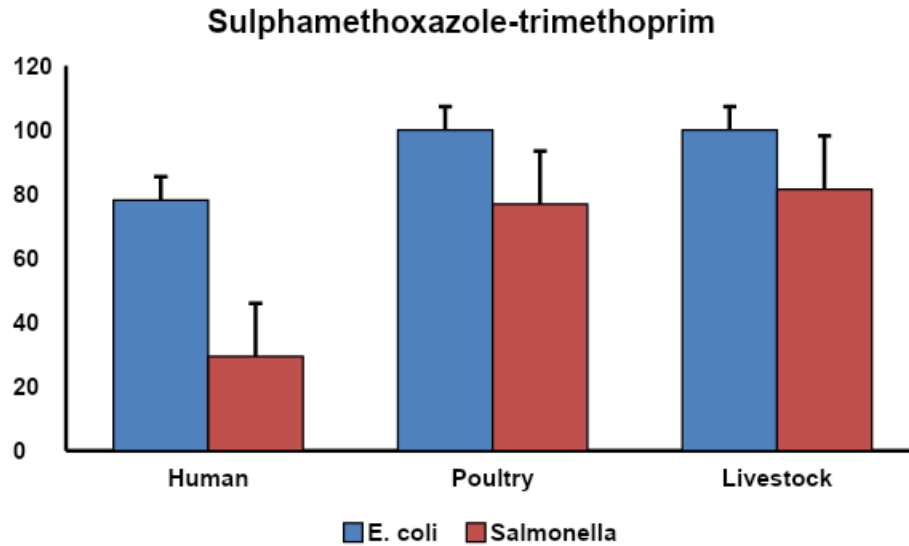


Fig. 12: Pattern of sulphamethoxazole-trimethoprim resistance in Bangladesh

5. 9 Resistance to Polymyxins

Colistin is a polymyxin antibiotic that is restricted in application for the cure of human illness, but it is still widely used in animal production [2, 109]. In Bangladesh, 2.9% to 48.84% colistin-resistant *E. coli* and 19.54% to 89.47% colistin-resistant *Salmonella* were observed from human and animals isolates. Similarly, García-Béjar et al. [88] and Hess et al. [110] also reported 73.68% and 87% resistant to colistin against *E. coli* from poultry isolates in Spain and Austria respectively. Phiri et al. [111] also found 78.70% Colistin-resistant *Salmonella* in Zambia. Figure 13 shows resistance of colistin to *E. coli* and *Salmonella*, where higher resistance was observed in *E. coli* in livestock.

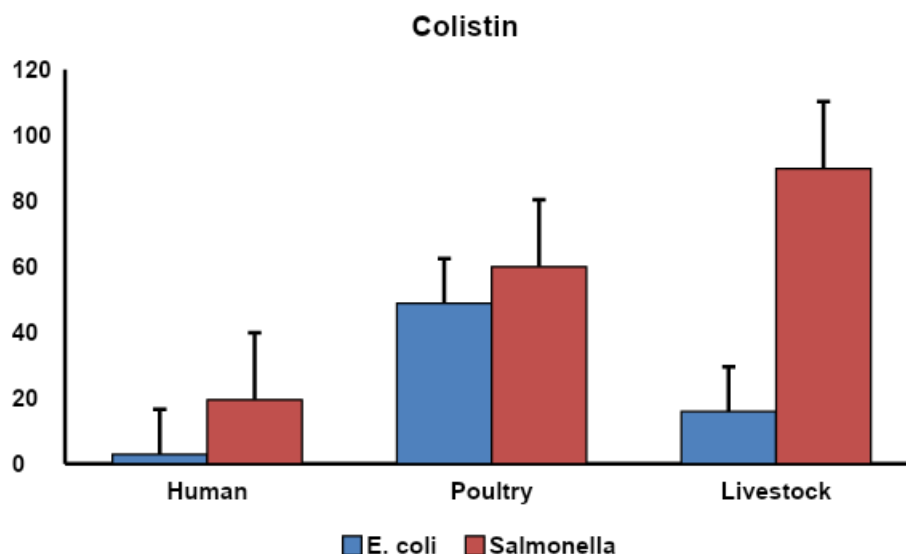


Fig. 13: Pattern of colistin resistance in Bangladesh

6. PREVENTION AND CONTROL MEASURES FOR *E. COLI* AND *SALMONELLA* SPP.

Antimicrobial resistance of *E. coli* and *Salmonella* spp. has a significant economic impact on every continent. It causes extra treatment expenses, loss of productivity, and death, all of which result in financial losses. Good personal hygiene, proper food handling, avoiding cross contamination of foods, and biosecurity system at farm level may reduce the clinical manifestation of diseases. Good cleanliness and an effective AMR surveillance system are essential to combat zoonotic infections and control *E. coli* and *Salmonella* infections. A national AMR monitoring system and strict use of antibiotics with proper management may also be helpful to reduce the growth of AMR.

7. CONCLUSION

Antimicrobial resistance is a critical issue that is increasing day by day. *E. coli* and *Salmonella* spp. have zoonotic significance, and AMR resistance genes may transfer through human and animal interactions. Penicillins, cephalosporins, quinolones, aminoglycosides, macrolides, tetracyclines, phenicols, sulphonamides, and polymyxins are different classes of antibiotics which were found to have higher resistance in this study. A similar group of antibiotics discovered resistance in humans, poultry, and livestock, which is extremely concerning for future AMR combat. Prevention and control measures with one health strategy may help reduce the risk of AMR transmission.

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