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Antibiotic Resistant Profile of Enteric Bacteria Isolated from Chicken Meats

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Abstract **–** Diseases that may arise due to microbial pathogens and biotoxins in foods pose serious dangers to human health. In recent years, there has been an increase in foodborne disease outbreaks as never before in the past. Epidemics are effective in much larger areas than before and create longer-lasting problems. Foodborne diseases not only affect the health of individuals, but also have broader consequences due to their impact on the income of families, loss of workload, and burden on the health systems of countries and their effects on economic productivity. Foodborne illnesses are over 250 and about a third of them are caused by bacteria. In this study, it is purposed that enteric bacteria analysis of 10 chicken meat samples and antibiotic resistant profile of isolates. The resulting isolates are *Escherichia coli*, *Proteus mirabilis, Serratia odorifera biogp 1, Kluyvera ascorbata*. Enteric isolates from chicken samples were tested for antibiotic sensitivity against vancomycin, ampicillin, kanamycin, oxytetracycline, erythromycin antibiotics by agar dilution method. According to results, high resistance rates of the obtained isolates to the antibiotics studied were also determined. The presence of important enteric pathogens and the high rate of antibiotic resistance carry significant public health risks in chicken meat consumption.

Keywords – Chicken, Enteric, Hygiene, Antibiotic, Bacteria

I. INTRODUCTION

In recent years, with the rapidly increasing population in the world and in our country, nutritional requirements, food production and consumption increase in direct proportion. Red and white meats have a very important place in food consumption in our country. In case of preference, there are points that strengthen the popularity of chicken meat. Chicken meat is a product with high nutritional value and is a very profitable consumption product in terms of cost. The annual per capita consumption of chicken meat in Turkey is calculated as 25 kg.

With the increase in population, the difficult process of meat production is sought with food technology. Food technology proves itself by minimizing basic food losses and processing consumer goods. In this process, meat technology shows that its place in food is very important. The important thing about these products is that they have superior qualities. For this reason, increasing consumption and the protection of this balance by the producers cause competition among the companies. Poultry's easy raising and short growing period, and the ease of accessibility of poultry meat compared to other meats, are rich in protein and essential fatty acids, and strengthen competition with its high biological value [1].

Foodstuffs contain variable amounts of microorganism species that are affected by the environment and conditions. The most important thing in meat and meat products is the total number of microorganisms detected on the carcass surface and on the tools and equipment surfaces as a result of post-slaughter contamination. As a result of

microorganism activity, the quality criteria of meat and meat products change rapidly, the duration of heat treatments such as pasteurization and sterilization is prolonged, economic losses increase, so important health problems that cause infection and food poisoning in humans arise with the consumption of food. If meat and its products are produced in conditions that do not comply with hygienic and technological rules, they can be risky in terms of food-borne diseases [2]. For this reason, the food hygiene and microbial quality of the manufacturers of the competition should increase the reviews on the products and strengthen the good hygiene practice conditions.

Food infections and intoxications caused by chicken meat consumption have increased in recent years and the desired quality for production has not been reached. For this reason, it is important to reveal antibiotic resistance profiles by screening for the presence of important pathogen group enteric bacteria as a microbial quality parameter in chicken meat bought from slaughterhouses or markets.

Along with the developing technology, food hygiene and safety should progress in parallel. In order to maintain that fine line between proper nutrition and healthy nutrition, food hygiene must be of the highest quality and carefully examined. For the meat and meat products consumed, the waiting time of the chicken meat on the counter is very important [3].

Among animal foods chicken products due to proper composition and environmental conditions the development of pathogenic and degrading agent microorganisms is an important resource. The most common pathogenic bacteria in chicken and chicken products are *Salmonella* spp., *Staphylococcus aureus*, *Escherichia coli*, *Campylobacter jejuni*, *Listeria monocytogenes*, *Bacillus cereus*, *Clostridium perfringens*, *Yersinia enterocolitica*, *Aeromonas* spp. ve *Shigella* spp.'dir. The spoilage factor microorganisms are *Alteromonas*, *Flavobacterium*, *Micrococcus*, *Proteus*, *Pseudomonas*, *Acinetobacter-Moraxella*, *Corynebacterium* [4].

As a result of excessive and incorrect use, antibiotic resistance has become an important problem in terms of human health. However, antibiotics used in medicine, animal husbandry and fish farms have also begun to cause accumulation in soil, groundwater or sea water [5].

The present study aims to monitor Enteric Bacteria occurring in chicken meats and determined antibiotic resistant of these isolates.

Materials and Method

Chicken Samples

10 chicken parts (5 wings and 5 breasts) were used in the study. Samples brought to the laboratory via cold chain.

Microbiological analysis

After dilution in peptone water, and then plated was done on the media [Chromogenic *E. coli* agar (CE), Eosin Methylene Blue Agar (EMB)] for the isolation of enteric bacteria. Plates were incubated at 25– 30°C for 24–48 h. Isolated colonies were identified as Murray et al., [6]. For obtained isolates, verification tests were performed according to Microgen ID-A panel-Gram negative (MID-64).

Antibiotic Resistant Profile of Isolates

Enteric isolates from chicken samples were tested for antibiotic sensitivity by agar dilution according to Clinical and Laboratory Standards Institute guidelines to 5 antibiotics [7]. Using standard antibiotics: Vancomycin (VA30 μg/mL), ampicillin (A10 μg/mL), kanamycin (K30 μg/mL), oxytetracycline (O30 μg/mL), erythromycin (E15 μg/mL). Isolates were reported as resistant, intermediate, or sensitive to each antimicrobial tested according to the Clinical and Laboratory Standard Institute [8].

II. RESULTS

List of isolated bacteria and antimicrobial resistant profiles were given Table 1-2, respectively. A total of 20 bacteria were obtained from 10 chicken samples. The most frequent isolate was *Escherichia coli* (85%).

Table 1. Isolated bacteria

Isolates No	Microgen ID
KE1	*Escherichia coli*
KE2	*E.coli*
KE3	*E. coli*
KE4	*E. coli*
KB3	*Proteus mirabilis*
BE1	*E. coli*
BE2	*E. coli*
BE3	*E. coli*
BE4	*E. coli*
BE5	*E. coli*

BE7	*E. coli*
BE8	*E. coli*
BT2	*Serratia odorifera biogp 1*
BB3	*Kluyvera ascorbata*
GE1	*E. coli*
GE2	*E. coli*
GE3	*E. coli*
GE4	*E. coli*
GE5	*E. coli*
GE6	*E. coli*

According to antibiotic resistant profiles results of isolates, the highest resistance profile was achieved against the VA30 and E15 antibiotics. However, the high resistance to all antibiotics is the most important evidence that antibiotic residues are present in chicken meat.

Table 2. Antimicrobial Resistant Profiles of Isolates

Isolates Codes	**Antibiotics**				
	VA30	**AMP10**	**K30**	**T30**	**E15**
KE1	8 R	8R	9 R	9 R	8 R
KE2	10 R	7 R	19 S	8 R	7 R
KE3	8 R	9 R	16 I	6 R	7 R
KE4	7 R	6 R	7 R	8 R	8 R
KB3	6 R	6 R	18 S	10 R	8 R
BE1	7 R	7 R	9 R	6 R	7 R
BE2	8 R	9 R	7 R	8 R	9 R
BE3	7 R	10R	7 R	9 R	7 R
BE4	7 R	6 R	7 R	8 R	8 R
BE5	7 R	7 R	8 R	7 R	7 R
BE7	6 R	7 R	12 R	6 R	6 R
BE8	9 R	7 R	14 I	7 R	8 R
BT2	7 R	7 R	15 I	7 R	7 R
BB3	7 R	21S	7 R	6 R	6 R
GE1	7 R	6 R	16 I	17 I	7 R
GE2	6 R	6 R	6 R	9 R	7 R
GE3	7 R	7 R	7 R	7 R	7 R
GE4	7 R	7 R	16 I	7 R	6 R
GE5	6 R	9 R	15 I	17 I	7 R
GE6	7 R	9 R	7 R	8 R	8 R
% R	**100**	**95**	**60**	**90**	**100**

R: resistant, I: intermediate, S: sensitive

III. DISCUSSION

E. coli is predominantly found in the human intestinal tract constitutes a non-pathogenic facultative flora. However, some strains of *E. coli* are causes of gastrointestinal, urinary tract and diseases of the central nervous system and septicemia. Pathogenic types of *E. coli* strains in humans and animals, can cause diseases - wound infections, meningitis, septicemia, artheriosclerosis, hemolytic uremic syndrome, etc.- the result of which goes to death diarrhea [9]. In many studies conducted in chicken meats microbiological quality, the presence of high levels of *E. coli* in chicken meat has been determined [1,4,10,11].

E.coli, *C. freundii*, and *P. vulgaris* which are the basic indicators of hygiene, were intensively isolated from the samples, which indicate the lack of sanitary conditions during the slaughter, production and storage. The most isolated bacteria in the study are *E.coli*. This overlaps the findings by Jimenez et al. [12], and Hacıoğlu and Doğanay [13] who found that the predominant species in the slaughtering process is *E.coli*.

Furthermore, high antibiotic resistance has been significant evidence that these poultry are exposed to high antibiotics during rearing. This situation is similar to the literature [12, 13].

IV. CONCLUSION

The presence of important enteric pathogens and the high rate of antibiotic resistance carry significant public health risks in chicken meat consumption. Therefore, comprehensive studies in this area are very important.

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