

INVESTIGATION OF SALMONELLA CONTAMINATION IN BEEF, MUTTON AND CHICKEN

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Abstract. *This study investigated Salmonella contamination in beef, mutton and chicken in deferent district of Kabul Province, Afghanistan. This study was conducted for 60 days in slaughterhouses in various district in Kabul province. Forty-five samples, including red meat and chicken, were sampled and tested. A total bacterial count, identification, and confirmation of Salmonella infection were performed using microbial tests and general and specific culture media. The highest average bacterial load was related to chicken wings in fifth district of Kabul city and was higher than the standard. Also, the highest rate of Salmonella infection in fresh chicken in seventeenth district of Kabul city and beef (frozen) in thirteenth district of Kabul city was higher than the standard. The high prevalence is often due to poor hygiene measures during transportation from food preparation and distribution centers to the animal feed market and is associated with Salmonella contamination. To reduce the burden of microbial contamination, periodic microbial tests and implementation of monitoring and control plans for critical points from slaughterhouses to supply and distribution centers, especially in cities with higher pollution levels, and improving the level of hygiene in slaughterhouses and food preparation and distribution centers of animal origin.*

Keywords: *meat, contamination, micro-organism, Salmonellosis, slaughterhouse, carcass.*

survive and reproduce in the host's tissue also contributes to their duration, which is done through resistance to the xenophagy power of phagocytes (Shekarforoush et al., 2013).

Also, the ability of salmonella to survive and be carried by the host for a long time, especially in relation to salmonella that is used to humans, is one of the other factors of the pathogenicity and prevalence of this bacterium in societies (Gill and Badoni., 2005).

Incomplete cooling of food, incomplete cooking of food, consumption of contaminated raw food and cross-contamination that is directly or indirectly contaminated by ready-to-eat food due to contact with contaminated raw food are among the most important factors that cause food Salmonella has been reported as the cause of food poisoning (Razavilar., 2008).

Raw food of animal origin is the main source of salmonella contamination in the kitchen of homes and restaurants due to insufficient cooking, employee contamination, as well as raw food contaminated with work tools and surfaces used in food preparation

1. Introduction

Salmonella is a rod-shaped, gram-negative bacterium that is unable to ferment lactose and sucrose. The pathogenic mechanism of Salmonella to humans includes serotypes that are accustomed to the human host, such as Salmonella typhi and Salmonella paratyphi, which usually cause a dangerous disease and are associated with enteric fever blood infection syndrome (Carasco et al., 2011).

Ubiquitous serotypes such as Salmonella Typhimurium that affect both human and animal hosts and produce gastroenteritis infection with different severity, less severity than enteric fever (Gill and Badoni., 2005).

In addition to food poisoning, these serotypes are involved in causing children's diarrhea and traveler's diarrhea, and serotypes that are highly accustomed to the animal host, such as Salmonella abortus and Salmonella gallinarum, are usually non-pathogenic or have very mild disease for humans (Razavilar., 2008; Roberts., 2005).

In recent years, salmonella poisoning has been widely observed due to new transmission of infection. The ability of Salmonella to

Institute of Standards and Industrial Research., 1992; Roberts., 2005).

Also, molecular diagnostic methods such as Multiplex PCR along with culture and other bacteriological methods can be effective in confirming the diagnosis (Javadi and Razavilar., 2007; Iranian Institute of Standards and Industrial Research., 1992; Roberts., 2005).

2. Aims: Aims of the study was to evaluate microbiological quality of the vender chicken, beef and mutton meet in Kabul city.

3. Materials and methods

This study was performed in 60 days in 2023, a total of 45 samples including red meat (fresh and frozen mutton, fresh and frozen beef), white meat (fresh and frozen chicken meat, chicken pieces) were randomly selected from different district of Kabul province slaughterhouses.

In order to perform microbial tests, one gram of each sample was taken and after dilution in 0.1% peptone solution for total bacterial count, using pour plate method (Kant agar plate culture media at 30°C for 72 hours) (Iranian Institute of Standards and Industrial Research., 1992).

In order to evaluate the amount of salmonella, 25 grams of each sample was weighed and homogenized and In order to isolate salmonella, swab containing peptone buffer was incubated at 37°C for 16-20 hours.

Then 100 ml of the culture media was added to 10 ml of Rappaport Veseliadis enriching culture media and incubated at 42°C for 18-28 hours.

Then, one milliliter of the current culture media was added to 9 milliliters of cysteine selenite culture media and incubated at 35°C for 24 hours, and confirmatory tests were performed from the grown colonies (Iranian Institute of Standards and Industrial Research., 1992).

4. Results

The results of this research showed that the highest average total bacterial load was related to chicken pieces and chicken breast in the first district of Kabul city and chicken wings in district 5 of Kabul city, and the lowest average total bacterial load related to frozen meat was in district 11 of Kabul city.

and processing, which causes the transmission of contamination (Carasco et al., 2011).

Salmonellosis is considered to be one of the most common food infections in the world, which causes a lot of damage to human societies in various health and economic dimensions every year (Iranian Institute of Standards and Industrial Research., 1992).

The type of food and the conditions of the host have played an essential and decisive role in the pathogenicity of this bacterium and the severity of its symptoms in patients. The minimum infectious dose to cause salmonellosis is 10^5 to 10^6 live Salmonella per gram of food, and according to the food standard, there should be no salmonella in 25 grams of food year (Iranian Institute of Standards and Industrial Research., 1992).

According to researchers' researches, foods contaminated with Salmonella include milk, eggs, beef, fish and poultry (Razavilar., 2008).

The incubation period of salmonellosis is usually between 12 and 36 hours and sometimes lasts up to 72 hours (Razavilar., 2008).

The symptoms of people with acute form of this disease include headache, nausea, vomiting, pain in the upper abdomen, fever of about 38 degrees and diarrhea, and people with chronic form are seen with symptoms of arthritis, endokaritis, pneumonia and urinary tract infection (Roberts., 2005).

People with salmonellosis often seem to recover and have no clinical symptoms, but the salmonella bacteria take up residence in the intestines, gall bladder, liver, and kidneys and are constantly excreted through feces or urine. Such people, who carry salmonella for weeks or years and excrete it, are considered a very serious risk for humans and animals (Razavilar., 2008).

Salmonella can be cultured by various laboratory methods, including the conventional culture method based on pre-enrichment in tetrathionate, cysteine selenite or Rapaport media and finally culture in selected Salmonella Shigella agar, McConkey agar and Brilliant Green media.MPN methods can also be used to count the number of bacteria (Iranian

Table 1. The average total bacterial load in beef, mutton and

Sample type	number of samples	Average total bacterial load	Target areas
Beef	5	2.5×10^2	Second district
Fresh mutton	5	3×10^2	11 th district
Chicken pieces	5	2.7×10^5	First district
Mutton (frozen)	5	2.4×10^5	Third district
fresh chicken	5	24.6×10^3	17 th district
Chicken wing	5	6.3×10^5	Fifth district
Chicken (frozen)	5	4.4×10^3	15 th district
Beef (Frozen)	5	1.2×10^3	11 th district
Chicken breast	5	2.7×10^5	Fifth district

(frozen) in district 11 and was higher than the standard. And the amount of salmonella contamination in the samples of 1, 11, 17 districts were higher than the standard.

Also, the results of examining the level of salmonella contamination showed that the highest level of salmonella contamination in fresh chicken was in district 17 and in beef

Table 2. The level of salmonella contamination in beef, mutton and chicken in Kabul city

Sample type	number of samples	Contaminated sample	The percentage of contamination	Target areas
Beef	5	0	0	Second district
Fresh mutton	5	1	19 %	11 th district
Chicken pieces	5	1	21 %	First district
Mutton (frozen)	5	0	0	Third district
fresh chicken	5	4	79 %	17 th district
Chicken wing	5	1	20 %	Fifth district
Chicken (frozen)	5	0	0	15 th district
Beef (Frozen)	5	3	60 %	11 th district
Chicken breast	5	1	21%	Fifth district

centers leads to the improvement of its health and safety and ultimately improves the health of consumers (Roberts., 2005 & Tsola et al., 2008).

In the present study, the amount of salmonella contamination in food of animal origin was observed in the first, third, 17th, 5th and 11th districts. The highest amount of salmonella contamination related to fresh chicken was 80% of contamination in district 17 and frozen beef was 60% of contamination in district (Razavilar., 2008).

One of the ways to reduce pathogenic bacterial agents for humans is to monitor the microbial quality of raw food of animal origin during production, storage and distribution methods (Gill and Badoni., 2005).

In order to improve health control, implement monitoring and critical control points (HACCP), food health risks are minimized or completely prevented, and on the other hand, consumer trust were catch in raw food products which gained from animal origin (Iranian Institute of Standards and Industrial Re-

5. Discussion

Food-borne diseases are one of the most important problems of the health network in societies. Salmonellosis is one of the major diseases caused by food. According to the Center for Disease Control and Prevention, Salmonella accounts for the most reports of foodborne disease outbreaks every year. In most parts of the world, epidemiological studies have shown an increase in infections caused by Salmonella serotypes (Javadi and Razavilar., 2007 & Roberts., 2005).

Salmonella species are one of the most important causes of common diseases between humans and animals, which have relatively high pathogenicity and are one of the most common causes of food-borne diseases due to the diversity of animal reservoirs (Javadi and Razavilar., 2007).

Determining the frequency of contamination of meat with salmonella bacteria along with other interventions such as compliance with HACCP, GMP and GHP principles in slaughterhouses and meat packing and supply

refrigerator was related to chicken thigh 62.5 ± 5.88 and breast 44.5 ± 0.47 . (Hossein nezhad yazdi et al., 2017). The results of that research have shown a higher level of pollution than the present study.

In the study of evaluating the condition of the carcass in terms of coliform bacteria, salmonella and psychrophilic bacteria in the abdomen emptying line and chiller of industrial chicken slaughterhouses, which was conducted by (Mofidi et al., 2014), there was no significant difference observed between other parts of the slaughterhouse and chiller in increasing and reduction of psychrophilic bacteria load. The results indicate that the secondary pollution in the slaughterhouse line and the gradual increase in the temperature of the chiller can be effective in increasing the microbial load of coli form bacteria and salmonella, which with management modification and also the installation of appropriate equipment and facilities in the emptying line can reduce the microbial load caused by coli form and salmonella.

In the study of (Niazi et al., 2007), which was conducted to investigate the prevalence of Salmonella Typhimurium, Salmonella Typhi and Enteritidis serotypes in Tehran industrial slaughterhouse, the results showed that the prevalence of bacterial contamination was present in 22.7% of food samples. Salmonella contamination of meat was estimated at 8.8% of all the food samples, 1.7% contamination with Salmonella was observed, of which 1.1% was related to Salmonella typhimurium and 0.59% was related to Salmonella enteritidis. The results of this research showed a lower level of pollution than the present study.

In the study on investigate the bacterial contamination of cow carcasses slaughtered in Yazd industrial slaughterhouse which performed by the (Soltan et al., 2015), The results showed that salmonella contamination was observed only in the carcass cleaning stage and in the rear parts of the hand muscles, calf muscles and rump, and 20% of the samples were infected with this pathogen, and after the final washing no salmonella was isolated from any sample. The results of this research are consistent with the results of the present study.

search., 1992; Javadi and Razavilar., 2007; Tsola et al., 2008).

Also, during the slaughtering process, contamination of the carcass with bacteria occurs due to its contact with the skin, knife, hands and clothes of workers, slaughtering tools and equipment, and water used to wash the carcass. When slaughtering, peeling the skin and emptying the intestines and viscera, microbes may cause contamination through the external parts of the animal or through the internal parts (intestines), Also, when cutting an animal's head with a knife, all the germs in the knife are transferred to all parts of the animal's body by the blood stream and cause contamination (Iranian Institute of Standards and Industrial Research., 1992).

The environment, which includes soil, water and waste, causes pollution. Also, the clothes, air and hands of employees increase the possibility of contamination. In addition, improper transportation and incorrect segmentation also increase the number of microbes (Roberts, 2005 & Shekarforoush et al., 2013).

In the study conducted by the (Hamedi et al., 2002), in order to investigate the contamination of salmonella in two types of local and machine eggs, three parts of both types of eggs were tested for the presence of this organism through sampling and culture on the environment. Common and specific Salmonella have been evaluated. 780 cultured was performed from 270 eggs, just two cases of salmonella group B were detected. In this study, it was determined that there is a possibility of contamination in eggs, even if it is small.

In the study of investigate the effect of washing and transporting chicken carcasses at different temperatures from the slaughterhouse to the place of supply, the results showed that the amount of salmonella was much higher than the standard amount. Carcass transportation by normal car, the highest Salmonella contamination rate was 278.03 ± 5.35 , and the minimum value was 33.9 ± 2.48 in refrigerated car, the highest amount of salmonella in transporting chicken by a normal car was 301 ± 8.03 .

Also, the highest amount of Salmonella in the transportation of chicken by a car with a

nation. The sanitary condition need to be improved. The government must develop microbiological standards of fresh meat and urgently put them in practice. The meat act must be implemented effectively. The control agency must be vigilant. Awareness programs for butchers and meat sellers also must be launched.

6. Conclusion

The study showed that degree of contamination is dependent upon the hygienic condition of those localities and the way of handling, cutting and preparing meat. All the findings of survey suggest about the unhygienic and unscientific method of handling, lack of sanitation and knowledge of microorganisms resulting higher number of contami-

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ИССЛЕДОВАНИЕ ЗАГРЯЗНЕНИЯ САЛЬМОНЕЛЛОЙ ГОВЯДИНЫ, БАРАНИНЫ И КУРИЦЫ

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Аннотация. В этом исследовании изучалось заражение сальмонеллой говядины, баранины и курицы в районе Деферент провинции Кабул, Афганистан. Это исследование проводилось в течение 60 дней на скотобойнях в различных районах провинции Кабул. Были отобраны и протестированы сорок пять образцов, включая красное мясо и курицу. Общих подсчет бактерий, идентификация и подтверждение сальмонеллезной инфекции были проведены с использованием микробиологических тестов и общих и специфических питательных сред. Самая высокая средняя бактериальная нагрузка была связана с куриными крылышками в пятом округе города Кабул и была выше нормы. Кроме того, самый высокий уровень заражения сальмонеллой у свежей курицы в семнадцатом округе города Кабул и говядины (замороженной) в тринадцатом округе города Кабул был выше нормы. Высокая распространенность часто обусловлена несоблюдением гигиенических мер при транспортировке из центров приготовления и распределения продуктов питания на рынок кормов для животных и связана с заражением сальмонеллой. Для снижения бремени микробного загрязнения необходимы периодические микробиологические тесты и внедрение планов мониторинга и контроля в критических точках от скотобоен до центров снабжения и распределения, особенно в городах с более высоким уровнем загрязнения, а также повышение уровня гигиены на скотобойнях и в центрах приготовления и распределения продуктов животного происхождения.

Ключевые слова: мясо, контаминация, микроорганизм, сальмонеллез, скотобойня, туша.