

Prevalence of Salmonella in Meat Products

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Abstract: To study the incidence of *Salmonella* spp. in meat products such as luncheon, burger, salami, kofta and minced meat, a total of 50 meat products samples were collected from shops and supermarkets; 10 samples luncheon; 10 samples burger; 10 samples salami; 10 samples kofta and 10 samples minced meat. Samples were investigated for the presence of *Salmonella* spp. by using bacteriological and biochemical tests. It was observed that 10% (1/10) of luncheon; 20% (2/10) of burger; 0% (0/10) of salami; 60% (6/10) of kofta and 40% (4/10) of minced meat were positive for salmonella. Higher rates of salmonella contamination were found in kofta and minced meat while lower rates found in salami, luncheon and burgers. Meat products are contaminated with salmonella especially products which consists of raw minced meat and not subjected to heat treatments. Raw materials used for manufacturing of meat products should be carefully selected and tested for freedom of salmonella.

Key words: Salmonella • Meat Products • Luncheon • Burger • Salami • Kofta • Minced Meat

INTRODUCTION

Salmonella is a gram negative rod, mostly non-lactose fermenter, facultative anaerobic, non-spore forming, mesophilic heterotrophs, produce acid and gas from glucose, belonging to the family *Enterobacteriaceae*, are classified and identified into serotypes according to the Kauffmann-White scheme 7 that currently contains more than 2000 serotypes [1]. Salmonellosis is still one of the major global causes of gastroenteritis in humans and animals [2]. Salmonella is one of the most commonly reported causes of food-borne disease in the European Union and show the highest disease burden on the population scale among bacterial food-borne pathogens [3]. *Salmonella* spp. is isolated with 84% from examined meat products and 51% of children were reported to be infected with the same serotypes isolated from meat samples, suggesting this pathogen is widespread in food and humans [4]. An outbreak of multidrug-resistant *Salmonella* Newport infections affected 42 case patients in USA in 2007, a case-control study implicated ground beef from one chain store [11].

Salmonella contamination in animals entering the slaughterhouse can be attributed to several sources such as lairages, holding pens, transport, animals' viscera (i.e., caecum content and lymph nodes), slaughter line points

and processing facilities, there is a strong link between the isolates recovered from carcasses and previous sources [5]. Faecal contamination of carcasses in the slaughterhouse is generally considered to be the source of salmonella contamination [6].

Contamination of minced meat with *Salmonella* is still considered a major problem in food hygiene [8, 9]. Food borne *Salmonella* infection is an important cause of morbidity and mortality worldwide. *Salmonella* spp. can be investigated in raw and cooked meat as well as meat products using culture methods employing Rappaport Vassiliadis agar, *Salmonella*-*Shigella* agar and brilliant sulphite agar, serology and PCR method for direct detection from samples [10].

In this study we investigate the prevalence of *Salmonella* in some meat products sold in shops and supermarkets.

MATERIALS AND METHODS

Collection of Samples: 50 meat products samples were collected from retailers and markets. 10 samples were collected from each product; luncheon, burger, salami, kofta and minced meat. Samples were collected in sterile polyethylene bags, put in ice tank under low temperature and transported to the laboratory for bacteriological examination.

Preparation of Samples: 25 g meat was taken from each meat product sample in sterile stomacher bag, mixed with 225 ml buffered peptone water (BPW) (Oxoid Limited, Hampshire, England) and homogenized by using Stomacher® 400 Circulator (Seward Ltd., UK).

Isolation and Identification: The samples mixtures incubated at 37 ± 2 °C for 18 ± 0.2 hours, 0.1 ml mixture was transferred to 10 ml Rappaport-Vassiliadis (RV) medium, vortexed and incubated for 24 ± 2 h at 41.5 ± 0.5 °C in circulating, thermostatically-controlled, water bath. Three microliter loopful (10 µl) of each incubated tube was streaked on Xylose Lysine Desoxycholate (XLD) agar and incubated for 24 ± 2 h at 35 ± 2 °C. Typical colonies of *Salmonella* were pink colonies with or without black centers. Many cultures of *Salmonella* may produce colonies with large, glossy black centers or may appear as almost completely black colonies. *Salmonella* isolates were confirmed by biochemical tests as Triple Sugar Iron (TSI) agar, Lysine decarboxylase (LIA), Urease, Indole, Methyl red, Voges-Proskauer and Simmons citrate utilization [12- 17].

RESULTS

Figure 1, Shows the overall prevalence of *Salmonella* spp. was 26% in the examined meat products.; Kofta and minced meat showed the highest contamination rates (40 and 60%) respectively; burger and luncheon exhibited lower contamination rates (20 and 10%) respectively while salami was uncontaminated with salmonella at all.

DISCUSSION

The over-all prevalence of *Salmonella* spp. in all meat products was 26% which agreed with some other studies such as Little *et al.* 28% [18], Essa *et al.* 23.3% [19] and Torlak *et al.* 23% [20]; higher than other results such as Kusumaningrum *et al.* 16.7% [21], Sjölund-Karlsson *et al.* 15.7% [22], Alemu *et al.* 15% [23], Ukut *et al.* 11.1% [24], Mbotto *et al.* 10% [25], Zhao *et al.* 3% [26], Kegode *et al.* 2.9% [27] and Datta *et al.* 0% [28]; and lesser than other studies such as Moffatt *et al.* 31% [29] and MMWR, 58% [30].

The highest percentage of *Salmonella* spp. was found in minced meat and kofta, 60% and 40% respectively, which higher than results of Hassanien *et al.* 20% [31] and lower than findings of Karaboz *et al.* 83% [32]. *Salmonella* spp. were not reported in salami while in other studies was found 12% [33, 34] and 55% of MMWR. Also, 20% positive *Salmonella* isolates in burger was higher than some finding of 4% by Fatim *et al.* [33] and

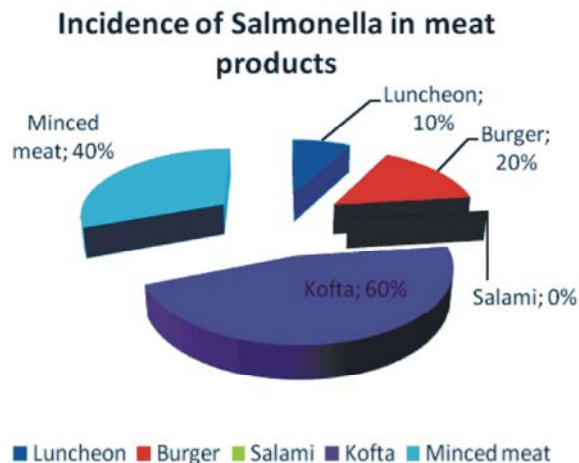


Fig. 1: Prevalence of *Salmonella* spp. in meat products.

lower than Essa *et al.*, [19] which is 23.3%. *Salmonella* spp. was positive in 10% of luncheon which were lower than results of Essa *et al.*, [19] that was 16.7%.

Higher incidence of salmonella spp. were found in kofta and minced meat, these results could be attributed to the physical conditions of kofta and minced meat (minced and less compact products) [35]; and the pre-cooked status without any heat that keep them more liable to microbial contamination.

Lower incidence of *Salmonella* spp. in luncheon, burger and salami could be due to heat treatment during manufacture and presence of chemical preservatives [37, 38]. Cutting boards, surfaces used for preparation of meat and equipments like meat grinders, mincers, blenders are considered an important source for meat contamination by *Salmonella* [39], while other studies mentioned that trucks, lairages, slaughter line, quartering, knives and surface of table are main sources of *Salmonella* contamination of meat and meat products [40]; contaminated water used to clean equipment and cutting/slicing machines leading to cross-contamination especially if used with raw foods, handlers not practising proper sanitation and faulty monitoring devices [41]. Survival of *Salmonella* in ready-to-eat products has the potential to cause illness

CONCLUSION

Meat products like luncheon, burger, salami, kofta and minced meat are considered important sources of pathogenic *Salmonella* spp. which causing sever gastroenteritis in human, especially products manufactured of raw and minced meat and not subjected for heat treatment. Good cooking of meat products before eating can tremendously decrease the incidence of *Salmonella*.

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