

Epidemiological Studies of *Aeromonas hydrophila* and its Public Health Importance

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Abstract: *Aeromonas hydrophila* is one of the most common enteric pathogens of man which is widely distributed in nature: in water, soil, food. It is also part of the normal bacterial flora of many animals. It is considered as potential food-poisoning agent that has been associated with the spoilage of food. One hundred and ninety nine rectal swabs and 64 meat samples from different animals, 11 water samples from different locations in farms and Abattoirs and 36 stool samples from human worked in farms and abattoirs were collected from Cairo and Giza Governorates. The results of this study revealed the occurrence of *Aeromonas hydrophila* in cattle, buffalo and camel was 42.3, 34.6 and 42% respectively while water samples were 63.6%. The occurrence of *Aeromonas* in meat samples was 37.5% while its occurrence in human revealed 16 out of 36 stool samples. The role of aeromonads and particularly of *A. hydrophila* as human pathogen and their transmission have been considered with high potential hazard to the surrounding environment.

Key words: Epidemiology • *Aeromonas hydrophila* • Public Health Importance • Egypt

INTRODUCTION

Aeromonas organisms are Gram-negative rods, emerging aquatic pathogens which are widely distributed in the environment [1]. It causes several disease conditions in cold-blooded animals (fish, reptiles, amphibians) and in warm blooded animals (mammals and birds) [2].

Aeromonas spp. acts as potential food-poisoning agents that has been associated with the spoilage of refrigerated (5°C) animal products including chicken, beef, pork, lamb, fish, oysters, crab and milk. It can produce different virulence factors, not only at optimal growth temperature, but also at refrigeration temperatures. This may be of importance for refrigerated food products that usually have an extended shelf-life at this temperature [3].

Since the wide distribution of *A. hydrophila* is probably a consequence of its high capacity to adapt to different environments. The distribution of the *Aeromonas* species was significantly related to levels of faecal pollution in waters [4].

A. hydrophila is part of the normal bacterial flora of many animals. In humans, *Aeromonas* causes different clinical symptoms as septicemia and infection of wounds and gastrointestinal tract where the common routes of

infection are the ingestion of contaminated water or food or contact of the organism with a break in the skin [5].

Aeromonas associated gastroenteritis principally affects children under the age of 5 years and is considered to be the second or third leading cause of bacterial gastroenteritis during summer months [6]. Therefore, our study was designed to investigate the presence of *A. hydrophila* from different animal species, water and meat samples in addition to stool samples from accompanied human.

MATERIALS AND METHODS

Collection of Samples: Samples were collected from different animal species (cattle, buffaloes and camels) from different farms and abattoirs in Cairo and Giza governorates.

- Rectal swabs from 199 different animals (104 cattle, 52 buffaloes and 43 camels)
- Meat samples from 64 different animals (45 cattle and 19 camel)
- Water samples were collected from 11 different locations in farms and Abattoirs.
- Stool samples were collected from 36 human worked in farms and abattoirs.

Preparation of Samples and Isolation: All fecal samples were transported in ice box to the laboratory in alkaline peptone water (APW) with pH 8.4 and then incubated at 28°C for 24 hrs, the incubated material was inoculated into Aeromonas agar base medium (Ryan) (Oxoid) (OXOID) and incubated for 37°C for 24 hrs [7].

Twenty five gm of each meat sample was obtained and homogenized in a stomacher, apparatus with 225 ml trypticase-soy broth (TSB) supplemented with ampicillin at the concentration of 30 mg/liter and incubated at 28°C for 24 hrs then the incubated material was inoculated into Aeromonas agar base medium (Ryan) (Oxoid) and incubated for 37°C for 24 hrs [8].

Water samples were first filtered through nitrate cellulose filter membrane (0.45 µm). The filters were placed on petri dishes containing Aeromonas agar base medium (Ryan) (Oxoid). All plates were incubated aerobically for 24 hrs at 28°C [4].

Identification of the Isolates: The suspected colonies appeared on the selective aeromonas agar media green with black center. Suspected colonies were stained by Gram's stain and examined microscopically.

The microorganism to be identified we used biochemical kit (API 20 E) then we recorded the results on the profile sheet. Identification was obtained by using Analytical profile index.

RESULTS AND DISCUSSION

The aeromonas organisms appear to be prevalent in nature, epidemiological studies have shown that it is found in water, fruit and vegetables [9, 10]. Aeromonas has also been considered a significant waterborne microorganism [10, 11].

The result reported in Table (1) shows that the occurrence of *Aeromonas hydrophila* in fecal samples from different animal species were 42.3% in cattle, 34.6% in buffalo and 42% in camel. These findings are lower than those of Kumar *et al.* [12] who recorded that the occurrence of *A. hydrophila* in buffaloes was 51.5% in India. While, Ghenghesh *et al.* [13] found that none of samples from cows and only 0.5% of samples from camels were positive for *Aeromonas* spp. in Libya

These variations in results can be related to the geographical location, the collection season and the microbial media used for isolation.

In this study *Aeromonas hydrophila* was isolated from water samples 63.6% as shown in Table (2).

Orozova *et al.* [14] isolated 26 *Aeromonas* strains from water samples; 5(19.2%), were *A. hydrophila* in drinking water that could pose a potential risk for public health. These findings proved the correlation between the presence of *A. hydrophila* in drinking water and the higher isolation ratio from feces of different animal species. Alonso *et al.* [15] found out that the cause of the infection was the contaminated drinking water.

The finding in Table (2) shows occurrence of *Aeromonas hydrophila* in meat samples were 40% in cattle and 31.5% in camel. This is similar to Pin *et al.* [16] who found the occurrence of *Aeromonas* in beef meat was 40% but differ from Rossi Júnior *et al.* [8] who isolated *Aeromonas hydrophila* from 9 cases (3.3%) out of 270 beef meat samples. The result obtained in this study is differ from the results recorded by Ghenghesh *et al.* [13] who found that 38 of beef meat and 67% of camel meat sold at retail outlets in Libya were positive to *A. hydrophila*.

The high percentage of contamination of meat with *Aeromonas hydrophila* may be due to the washing of the animal's skin with contaminated water leading to contamination of meat samples during the various phases of slaughter. Another source of infection may be the used knives which may be easily contaminated from the skin surface, gastrointestinal contents, water and other sources [8].

Another scenario for contamination of meat with *Aeromonas hydrophila* is its presence in the digestive tract of animals with the exposure of animals to water sources containing the microorganism and the contamination of the carcass with intestinal content resulting in the transfer of pollutants between carcasses through cross-contamination during processing [17].

Aeromonas hydrophila could not be considered to be normal inhabitants of the human gastrointestinal tract which can be transmitted through direct contact among animals and men and hence the risk of the infection is relatively high [7]. The result of the occurrence of *Aeromonas* in human was 43.8% which is higher than that of Rathinasamy *et al.* [18] who isolated 21 cases (9.7%) out of 216 stool samples from human and Basil *et al.* [19] who found 138 (27.6%) out of 500 stool samples from patients were positive.

Aeromonas hydrophila was isolated from 38 (2.4 %) human cases as the sole enteropathogen, suggesting that *A. hydrophila* could be responsible for diarrhea in human [20].

Table 1: Occurrence of *Aeromonas hydrophila* in fecal samples:

Isolation source	Number of examined samples	Number of positive samples (%)
Cattle	104	44 (42.3)
Buffalo	52	18 (34.6)
Camel	43	18 (41.8)
Human	36	16 (44.4)
Total	235	96

Table 2: Occurrence of *Aeromonas hydrophila* in meat and water samples

Isolation source	Number of examined samples	Number of positive samples (%)
Cattle	45	18 (40)
Camel	19	6 (31.5)
Water	11	7 (63.6)
Total	75	31

CONCLUSIONS

Among certain infectious diseases, infection with *Aeromonas* bacteria remains a potentially serious threat to public health and increased understanding of the species of *Aeromonas* in animals and humans has stimulated interest in the possible presence and distribution in Egypt of various animals.

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