

Research Article

Prevalence and anti-microbial susceptibility of salmonella isolated from feces of patients with diarrhea in Egyptian hospital Mogadishu_Somalia

Abdirahman Ahmed Osman*

Department of Medicinal Science, Jazeera Specialist Hospital, Mogadishu, Somalia.

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Background: Salmonella infection risk is higher in populations that lack access to safe water and adequate sanitation. Poor communities and vulnerable groups including children are at highest risk. Improved living conditions and the administration of antibiotics resulted in a drastic reduction of salmonella infection morbidity and mortality in industrialized countries. In developing areas of Africa, the Americas, south-east Asia and the western pacific regions, however, the disease continues to be a public health problem. Even when the symptoms go away, people may still be carrying typhoid bacteria.

Method: This study was descriptive in design which means to describe the problem under investigation. In this type of design, the research aims to describe the prevalence and anti-microbial susceptibility testing of salmonella isolated from feces of patients with diarrhea. The study was also cross sectional. In this type of design, the researcher intended to collect re- search data at one point in time. The study was also quantitative in design which means to determine a particular problem numerically. The target populations were people with diarrhea those who visit at Egyptian hospital. The studies were conducted in two months estimate patients during that time were 50 patients.

Results: The majority of the respondents 20 (39.2%) were between 20-30 years old, 12 (23.5%) were between 10-20 years old, 10(19.6%) were between 30-40 years old, while only 8(15.7%) were between >40 years. The majority of the respondents 28 (54.9%) were male, while only 22 (43.1%) were female. The majority of the patient results 29 (56.9%) were other species, 17 (33.3%) were *Salmonella typhi*, while only 4 (7.8%) *Salmonella paratyphi*. High rates of resistance against multiple antimicrobials were observed in most of the isolates. The isolates showed 100% resistance to each of ampicillin, amoxicillin-clavulanic acid and Cephalothine, and 90% to ceftriaxone. The least effective drugs were chloramphenicol 14%, ceftriaxone and Norfloxacin 5% for both of them. The most effective drugs were ciprofloxacin, with 57% isolates being susceptible to the drug. The most resistant isolates were *Salmonella typhi*, which showed 87.5% resistance to ampicillin, 75% to chloramphenicol, and 62.5% to ciprofloxacin.

Conclusion: Results from this study indicate that, most prevalent salmonella strains that cause the majority of acute diarrheal diseases in this study belonged to *S.Typhi*. The results indicate high rates of antibiotic resistance against *S.Typhi*. The higher resistance observed to ampicillin, amoxicillin-clavulanic acid Cephalothine, and to ceftriaxone is of major concern. Most effective drug was ciprofloxacin.

*Corresponding author. Abdirahman Ahmed Osman,
E-mail: Arahmaanahmed1@gmail.com.

salmonellosis transmitted by food. Humans usually become infected by eating foods contaminated with feces from an infected animal. As a result, implicated foods are often of animal origin such as beef, poultry, milk, and eggs [2].

Clinical features

Salmonella infection is usually caused by eating raw or undercooked meat, poultry, eggs or egg products. The incubation period ranges from several hours to two days. Most salmonella infections can be classified as stomach flu (gastroenteritis). Possible signs and symptoms include: stomach cramps, bloody stools, chills, diarrhea, fever, headache, muscle pain, nausea, vomiting and dizziness. Signs and symptoms of salmonella infection generally last two to seven days. Diarrhea may last up to 10 days, although it may take several months before bowels return to normal.

METHODOLOGY

Laboratory diagnosis

Diagnosing salmonella infection requires testing a specimen, such as stool or blood, food or environmental samples.

Sample transport .This provides guidance on how to collect a fecal specimen and transfer to transport medium for diagnosis of acute bacterial diarrheal disease.

Specimens that cannot be cultured within 2 hours of collection should be placed in cary_blair transport medium and refrigerated immediately.

Media: Xylose lysine deoxycholate agar and salmonella shigella agar are a selective medium used in the isolation of salmonella and shigella species from clinical samples and from food.

Biochemical reaction antimicrobial sensitivity : All suspected salmonella colonies were picked from the agar plates and inoculated into the following biochemical test tubes for confirmation: triple sugar iron (tsi) test (presumptive salmonella colonies produce black colonies or colonies with black centers and red medium on tsi agar) , citrate test (presumptive salmonella colonies produce blue color for the citrate test), urease test (presumptive salmonella colonies produce purple-red color for the urease test), lysine decarboxylase (ldc) agar test (presumptive salmonella colonies produce purple-coloured colonies on ldc agar), and indole test (presumptive salmonella colonies produce violet-coloured colonies for the indole test). Plates were incubated for 24 or 48 hrs. At 37°C. Colonies were also tested for catalase production.

The disc diffusion test was done for each isolate on mueller-hinton agar. Approximately 20 ml of medium was poured into 90 mm diameter sterile petri dishes to a depth of 4 mm and left at 37°C overnight to check for sterility. Five ml tryptic soya broth was inoculated with test isolates and incubated at 35°C for 4 hr [3]. Culture

of each isolate was compared with 0.5 McFarland turbidity standards (if necessary adjusted by adding sterile saline into tubes). Isolates were inoculated on mueller-hinton agar using swabs and inoculated plates were left at room temperature for 30 min to allow drying. Salmonella isolates were tested for susceptibility to the following 7 antibiotics Ampicillin (10 mg), amoxicillin/clavulanic acid (30 mg), ceftriaxone (30 mg), chloramphenicol (30 mg), ciprofloxacin (30 mg), Cephalothine (10 mg), Norfloxacin (30 mg) using the disk diffusion method according to guidelines set by the Clinical Laboratory Standards Institute (clsi) antibiotic impregnated discs were dispensed on the surface of cultures of muller-hinton agar and incubated at 35°C for 20 hrs. The diameters of the zones of inhibition were recorded to the nearest mm and classified as resistant, intermediate, or susceptible according to established interpretive chart.

Serological diagnosis of salmonella infection: Serological tests used in the diagnosis of enteric fever yield limited sensitivity and specificity. The Widal test is used to measure antibodies against o and h antigens of *S. typhi*. Newer diagnostic tests (typhoid, tube) allow direct detection of immunoglobulin m (igm) antibodies against specific s typhi antigens.

Salmonella serotypes: Serotyping is done by mixing cells with antibodies for a particular antigen. It can give some idea about risk. Serotyping can assist identify the source of contamination by matching serotypes in people with serotypes in the suspected source of infection. Appropriate prophylactic treatment can be identified from the known antibiotic resistance of the serotype.

Treatment: Most people with salmonella recover in four to seven days and do not need treatment. During the illness, the person should drink plenty of fluids to replace the fluid lost by diarrhea. A person who has severe diarrhea or is sick for longer than a week may need to be hospitalized. In the hospital, he or she will be treated with intravenous (IV) fluids. Antibiotics may be used to treat infants, people over age 65, people with a weak immune system (like cancer patients), and those who have severe diarrhea and a high fever and have the bacteria in their bloodstream. The recommended antibiotics for individuals at high risk for invasive disease include chloramphenicol, ampicillin, amoxicillin, and trimethoprim-sulfamethoxazole (tmp-smz). In areas with multidrug resistance, cefotaxime or ceftriaxone are recommended.

Prevention: The best way to minimize the chance of salmonella outbreaks is to ensure that food from animal origins, such as eggs, meat or chicken, is properly cooked. Other salmonella prevention tips: Avoid eating foods that put you at high risk for salmonella infection, such as raw eggs, undercooked chicken and unpasteurized milk. Keep food refrigerated at the proper temperature before it's cooked. Wash your hands with soap and warm water before handling food. Clean surfaces, such as kitchen countertops, before fixing food

Table 4. Shows distribution of the study sample according to the occupational status.

Occupational status	Frequency	Percent
Housewife	17	33.3
Daily labor	19	37.3
Student	12	23.5
Others	2	3.9
Total	50	98

Table 5. Shows distribution of the study sample according to the marital status.

Marital status of respondent	Frequency	Percent
Mirage	18	35.3
Single	24	47.1
Divorced	5	9.8
Widowed	3	5.9
Total	50	98

According to table 5, the majority of the respondents 24 (47.1%) were single, 18 (35.3%) were married, 5 (9.8%) were divorced, while only 3 (5.9%) were widowed.

Table 6. Shows distribution of the study sample according to the resident of respondent.

Resident of respondent	Frequency	Percent
Urban	41	80.4
Rural	9	17.6
Total	50	98

According to table 6 the majority of the respondents 41 (80.4%) were urban, while only 9 (17.6%) were rural.

Table 7. Shows distribution of the study sample according to the result of patients.

Result of patients	Frequency	Percent
<i>Salmonella typhi</i>	17	33.3
Other salmonella(other than type a)	4	7.8
Total	21	41.1

According to table 7 the majority of the patient results 29 (56.9%) were other species, 17 (33.3%) were *Salmonella typhi*, while only 4 (7.8%) *Salmonella paratyphi*.

obtained from Sudan 76% and Kenya 90% (2). Antimicrobial treatment can reduce the symptoms of a disease, decrease the number of carriers, and prevent the spread of the infection. In our study a high proportion of the isolates were resistant to the conventional first line antibiotics and others (ampicillin 100%, Amoxicillin-Clavulanic acid 100%, Cephalothine 100%, Ceftriaxone 90% and chloramphenicol (81%). High resistance rate documented in South Sudan for amoxicillin and ampicillin (90-100%) (3) Also high resistance to ampicillin (72%), chloramphenicol (72%) recorded in Kenya recorded (4) also another study concluded similar results (5).

In this study, ciprofloxacin results showed that 38% of the isolates were resistant. Reduced susceptibility to ciprofloxacin, poses a serious threat to the treatment failure of typhoid fever, especially in developing countries. Similar findings have been reported in other African countries. A relatively high intermediate resistance was seen in Ciprofloxacin in Kenya (6). In contrast to published findings in Kenya documented, 94% of sensitivity to ceftriaxone. However, in resource-limited countries, clinicians are enforced to clinically diagnose and pre- scribe broad-spectrum antimicrobials empirically, also self-medication and unrestricted use of these drugs and low quality drugs may have driven the consistent increase in the prevalence of Multiple Drug Resistance (MDR) strains.

FINDINGS

The majority of the respondents 20 (39.2%) were between 20-30 years old, 12 (23.5%) were between 10-20 years old, 10 (19.6%) were between 30-40 years old,

CONCLUSION

All the activities related to dairy farming was performed by female dairy farmers. Small size female dairy farmers Results from this study indicate that, most prevalent salmonella strains that cause the majority of acute diarrheal diseases in this study belonged to *S.Typhi*.

The results indicate high rates of antibiotic resistance against *S.Typhi*. The higher resistance observed to ampicillin, amoxicillin-clavulanic acid Cephalothine, and to ceftriaxone is of major concern. Most effective drug was ciprofloxacin.

while only 8 (15.7%) were between >40 years. The majority of the respondents 28 (54.9%) were male, while only 22 (43.1%) were female.

The majority of the respondents 22 (43.1%) were no formal education, 12 (23.5%) were collage/university, 10 (19.6%) were secondary, while only 6 (11.8%) were others.

The majority of the respondents 19 (37.3%) were daily labor, 17 (33.3%) were housewife, 12 (23.5%) were student, while only 2 (3.9%) were others.

The majority of the respondents 24 (47.1%) were single, 18 (35.3%) were married, 5 (9.8%) were divorced, while only 3 (5.9%) were widowed.

The majority of the respondents 41 (80.4%) were urban, while only 9 (17.6%) were rural. The majority of the patient results 29 (56.9%) were other species, 17 (33.3%) were *Salmonella typhi*, while only 4 (7.8%) *Salmonella paratyphi*.

High rates of resistance against multiple antimicrobials were observed in most of the isolates. The isolates showed 100% resistance to each of ampicillin, amoxicillin-clavulanic acid and Cephalothine, and 90% to ceftriaxone. The least effective drugs were chloramphenicol 14%, ceftriaxone and Norfloxacin 5% for both of them.

The most effective drugs were ciprofloxacin, with 57% isolates being susceptible to the drug. The most resistant isolates were salmonella typhi, which showed 87.5% resistance to ampicillin, 75% to chloramphenicol, and 62.5% to ciprofloxacin.

RECOMMENDATION

The researcher recommends the following:

- Further, multicenter study including larger numbers of samples would have generated more significant results.to minimize the emergence and spread of resistance we recommend a prudent approach to the availability and usage of antibiotics in Somalia so that only qualified trained and medical personnel should administer antibiotics to patients.
- There is also need to improve laboratory capacity detection and surveillance of typhoid.
- There is an urgent need for regular surveillance and monitoring of antibiotics to be aware of the trend and also tackle antibiotic resistance.
- Giving health education to the society in banadir region in mogdishu-somalia in order prevent the risk most disease from the whole

