Article

Study Role of Salmonella Bacteria Infection on Patients with Liver Disorders

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Abstract: Salmonella is considered one of the important record food-borne pathogens. It is considered one of the most worldwide concerns of public health. This foodborne pathogen consists of more than 2500 Salmonella serotypes that were identified, also over half of it are related to subspecies, Salmonella enterica. Subspecies, enterica that is related to the major infections of Salmonella bacterium in persons. An infection with Salmonella that appeared in invasive serotypes is dangerous and deadly, needing suitable and accurate use of antibiotic treatment. The presence of multi-drug- resistant (MDR) types, these serotypes of Salmonella is effect critically on the efficiency of antibiotic treatment, so, growing the state of being MDR strains may be a principal problem in rising mortality rates after infections of Salmonella.
Study aims to find the relation of infection with Salmonella bacteria as a pathological agent to cause liver disorders. Thirty-nine samples were a collection from patients suffering from liver failure. All patients were identified using Roche automated system (clll). Stool samples of the same patients were cultivated on blood agar medium, McConkey and S-S agar media and the result showed 20 samples contain Salmonella typhi bacteria and this leads us to conclude that infection with Salmonella typhi bacteria has a relation with patients suffering from LF disorders.

Keywords- Salmonella, Foodborne pathogen, Multidrug-resistant (MDR) strains, Liver failure, Salmonella typhi.

Important
Key findings: Key findings include: 20 out of 39 stool samples from patients with liver failure contained Salmonella typhi bacteria; the presence of Salmonella typhi bacteria was identified using the Roche automated system and cultivation on blood agar, McConkey, and S-S agar media; this suggests a potential relationship between Salmonella typhi infection and liver failure. **What is known and what is new?** The known aspect is the general relationship between Salmonella and liver disorders. The new contribution is the specific empirical study on the association between Salmonella typhi infection and liver failure, providing insights into the prevalence and potential link between the two in a clinical setting. **What is the implication, and what should change now?** The implication is that Salmonella typhi infection may be a significant contributor to liver failure in some patients. Changes needed include increased awareness among healthcare professionals about the potential link between Salmonella typhi and liver disorders, and the need for early diagnosis and appropriate antibiotic treatment to prevent complications.

INTRODUCTION

Infection with Salmonella is considered the most important public health concern around the world, backed by the

profitable load of both industry conditions and underdeveloped states concluded the budgets associated with it, treatment, and prevention of this crucial disease related to this foodborne pathogen [1]. Salmonella bacteria is a Gram-negative motile bacterium that customize flagella appendage for locomotion. Salmonellosis is considered a food-borne infection of the gastro-intestinal tract in addition to had shown to have in elevation prevalence ratios. The causative agent (Salmonella) has the ability to transmit from the human feces of an infected individual or (infected animal) to well ones [2]. Salmonella bacteria have almost more than 2500 defined serotypes [3]. Salmonella could survive and persist for long periods in conditions with low moisture of foodstuffs [4].

Salmonellosis is associated with the consumption of food products contaminated with Salmonella, generally from egg products, poultry and beef as well; Reduced hand washing and the continuous contact of the workers with infected domestic animals are some further contamination paths. When infective amounts are ingested (eaten or drank), therefore, sickness occurs as a result of pathogens colonizing inside the intestinal tract [5].

The riskiness and intensity of Salmonella infections are based on the specified strain that is blamed for causing infection and also the health situation of the individual. The elderly, Children under five of their ages and most adults with immunocompromised issues are considered a group of individuals that are more susceptible to get sick with salmonellosis [6].

Salmonellosis is often distinguished by gastroenteritis or called (stomach flu). This disease is related to different symptoms such as vomiting, nausea, abdominal cramps, and occasionally bloody diarrhea. As well associated with myalgia, headache, fever conditions, and uninterrupted loss of body fluids, these symptoms together may cause dehydration mostly for infants and the elderly infected individuals [7]. Salmonellosis is a self-limiting illness that may cease within almost a week, but the occurrence of deaths has been recorded mostly in immunocompromised persons, children, or very elderly persons that are vulnerable to infection [6].

Salmonella displays a notable characteristic during the process of its invasion against humans through non-phagocytic host cells [8] however; it essentially has an induction to its process of phagocytosis to gain right of entry through the host human cell of an infected host. The notable genetics fundamental this inspired strategy established in Salmonella pathogenicity islands (SPIs), presence of gene bands at the bulky chromosomal DNA region and expression for these structures that are involved in the remarkable inroad process [9].

A problem appeared during the manifestation of typhoid (hepatitis). Typhoid infection (typhoid hepatitis) is some of the uncommon performances of typhoid fever and is well defined as a changeable contribution of the liver for the duration of the course of typhoid fever. by endemic regions, fever and people with liver-based expression should fear the medical care staff about suspect the incidence of typhoid since mimic symptoms of other diseases may occur widely in these regions, such as infection of viral hepatitis, malaria, or infection with amoebic hepatitis [10] [11],Blood or tissue samples that were subjected to bacterial cultivation, which deliberated as the key routine to diagnose the presence of disease with an exactness sort from 45% to 65% for cultivation with blood samples in the first establishment of the disease. While the positive results on or after the cultivation of stool and urine samples may not be noticed only after one week of the incident of illness [10].

METHODOLOGY

Sample preparation

Thirty-nine blood samples were collected from patients suffering from liver failure and have been centrifuged to separate serum for liver functions tests. Specimens of stool were also collected from the same patients for microbiological culture.

Table (1) Normal Values Of Liver Enzymes

NORMAL VALUES OF LIVER ENZYMES	
TSB	0-0.8 mg\dl
GOT	10-34U\L
GPT	10-40 U\L
ALP	24-147U\L

Measure the Liver function tests in the manual Method
Total serum bilirubin, GPT, GOT and alkaline phosphatase have been using Roche automated system (clll) with manufacturing kits procedure.

-Culture Media Preparation

-Blood Agar Base Medium:
According to the company notes and Guidelines, Blood agar was prepared after sterilization and cooled to 45-50˚C and aseptically enhanced with 5% sterile blood, then homogenized quietly and then dispensed into Petri dishes.

MacConkey agar medium:
According to the company notes and Guidelines, the medium was prepared after sterilization and cooled to 45-50˚C and then homogenized gradually and poured into Petri dishes.

S-S agar medium
Depending on the company notes and Guidelines. The used medium was sterilized and cooled to 45-50˚C and. It was homogenized gradually and poured into different Petri Dishes.

RESULTS AND DISCUSSION

The results of our study (**table-2**) revealed that there is a difference in result between samples and that because the different cases of each patient are related to their severity and other risk elements such as the age of the person, sex, and related disease [12].

Table (2): Show the difference in result between(A.AST,AND.ALT and.ALP)

no.	Automated TSB	A.GOT\AST	A. GPT\ALT	A.ALP
1	1.0	32	38	142
2	0.8	29	36	101
3	0.4	11	28	90
4	0.1	30	39	130
5	0.1	25	32	101
6	0.7	39	42	162
7	0.9	72	40	152
8	0.5	29	24	70
9	1.1	36	30	80
10	1.2	44	64	160
11	0.8	29	34	130
12	0.5	25	30	113
13	0.3	22	25	83
14	0.1	21	19	60
15	1.6	52	62	163
16	1.3	41	40	143
17	0.5	20	20	82
18	0.3	20	21	60
19	0.1	19	11	26
20	0.1	11	19	43
21	0.1	19	30	102
22	0.1	29	31	90
23	0.5	19	40	145
24	0.6	30	25	130
25	0.1	29	31	120
26	0.9	21	25	101
27	0.5	31	30	130
28	0.4	29	11	109
29	0.3	31	11	90
30	0.1	29	40	130

31	0.5	29	29	121
32	0.3	31	41	140
33	0.2	29	41	109
34	0.1	29	34	103
35	0.1	31	34	109
36	0.2	30	34	103
37	0.1	29	41	140
38	0.9	21	39	109
39	0.3	23	21	90

In parallel to the liver, functions result microbiology results there is a strong relationship between patients with liver disorders and salmonella infection since 20 stool samples that taken from the same patients were cultured on media specifically on S-S agar showed salmonella bacteria, and this lead to conclude that most liver disorder back to these bacteria when to stay it in the gallbladder. The disease severity contrasts from gastro-enteritis to occurrence of septicemia and development of abscess which then considers the most important reason for mortality and morbidity.Salmonella infection can take part in any region of the abdomen area, however, most frequently take place in the hepato-biliary system and spleen [13]. Other results also revealed when blood and urine samples were acquired from patients with serious liver disorders and abdominal complaints, USG demanded to discover any abdominal collection that considers as a source that lead to occurrence of sepsis, since that, their results showed the region was significantly larger than showed before illustrious with an underlying abscess since blood agar culture showed grew Salmonella Paratyphi A [13],[14].

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Ethical approval: The study was approved by the Institutional Ethics Committee of Mustansiriyah University.

REFERENCES

1. .Crump, John A., Stephen P. Luby, and Eric D. Mintz. "The global burden of typhoid fever." Bulletin of the World Health Organization 82.5 (2004): 346-353.https://www.scielosp.org/pdf/bwho/v82n5/v82n5a08.pdf
2. 2Ferrari, Rafaela G., et al. "Worldwide epidemiology of Salmonella serovars in animal-based foods: a meta-analysis." Applied and environmental microbiology 85.14 (2019): e00591-19.https://doi.org/10.1128/AEM.00591-19
3. 3Eng, Shu-Kee, et al. "Salmonella: a review on pathogenesis, epidemiology and antibiotic resistance." Frontiers in Life Science 8.3 (2015): 284-293. https://doi.org/10.1080/21553769.2015.1051243
4. Podolak, Richard, et al. "Sources and risk factors for contamination, survival, persistence, and heat resistance of Salmonella in low-moisture foods." Journal of food protection 73.10 (2010): 1919-1936.https://doi.org/10.4315/0362-028X-73.10.1919
5. Munck, Nanna, et al. "Source attribution of Salmonella in Macadamia nuts to animal and environmental reservoirs in Queensland, Australia." Foodborne pathogens and disease 17.5 (2020): 357-364. https://doi.org/10.1089/fpd.2019.2706
6. Turgeon, Patricia, et al. "Forecasting the incidence of salmonellosis in seniors in Canada: A trend analysis and the potential impact of the demographic shift." PLoS One 13.11 (2018): e0208124. https://doi.org/10.1371/journal.pone.0208124
7. Spickler AR, Larson L, Salmonellosis K. Available online: http://www. cfsph. iastate. edu. DiseaseInfo/factsheets. php (accessed on 3 August 2022). 2013.
8. Hansen-Wester, Imke, Bärbel Stecher, and Michael Hensel. "Type III secretion of Salmonella enterica serovar Typhimurium translocated effectors and SseFG." Infection and immunity 70.3 (2002): 1403-1409. https://doi.org/10.1128/iai.70.3.1403-1409.2002
9. Grassl, Guntram A., and B. Brett Finlay. "Pathogenesis of enteric Salmonella infections." Current opinion in gastroenterology 24.1 (2008): 22-26.DOI: 10.1097/MOG.0b013e3282f21388
10. Khosla, SN15, et al. "The spectrum of hepatic injury in enteric fever." American Journal of Gastroenterology (SpringerNature)83.4(1988). https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=00029270&AN=16158533&h=Z7KU7tdXyKJOWQ%2FI55p8hTod%2BKccu%2BjpSfbc0HKskv2FNI5h4bydVnJnL8SQHWuMGBxnWKSru5XWRqROLTMFlw%3D%3D&crl=c

11. Nelwan, R. H. H. "Changing pattern of typhoid fever complications in Indonesia." Medical Journal of Indonesia 7 (1998): 105. DOI:10.13181/mji.v7iSupp1.1050
12. Weber, Sabine, et al. "Liver function test abnormalities at hospital admission are associated with severe course of SARS-CoV-2 infection: a prospective cohort study." Gut 70.10 (2021): 1925-1932. https://doi.org/10.1136/gutjnl-2020-323800
13. Sangwaiya, A., et al. "Simple liver cyst as a focus of Salmonella paratyphi abscess: a case report." Journal of Tropical Medicine 2009 (2009). https://doi.org/10.1155/2009/456810
14. 14.Singh, Parul, et al. "Hepatic Abscess Caused by Salmonella enterica subsp. enterica, Serovar Typhi: Case Report." SN Comprehensive Clinical Medicine 2 (2020): 1236-1239. https://link.springer.com/article/10.1007/s42399-020-00371-4