



Fetal Death in Cholera Infected Pregnant Women: A Clinical Case Report

Mohammed Aldhamari ^{1*}, Fawaz Alshawili ¹, Ameen Shabah ¹, Mohammed Amood Al Kamarany ^{1,2*}

¹ Center of Tropical Medicine and Epidemiology Studies of Hodeidah University (CTMES-HU), Hodeidah, Yemen

² Center of Tropical Medicine and Infectious Diseases (CTMID), Authority of Public AL Thawara Hospital, Hodeidah, Yemen

*Corresponding author E-mail: mohammedaldhamari@hoduniv.net.ye; alkamarany2022@hoduniv.net.ye

Received: 06 December 2024. Accepted: 20 June 2025. Published: 30 June 2025.

Abstract

Numerous cases of cholera infections related to the death of a fetus in pregnancy were reported in Yemen about the risk factors contributing to this death. This case report aims to explore more data about cholera in pregnancy related to the death of a fetus in Hodeidah, Yemen. The case reported here shows a 24-year-old female pregnant in the last trimester, with severe diarrhea more than 15 times per day, severe vomiting and severe dehydration with sunken eyes, and fatigue as the major symptoms with fetal signs of cholera infection. The patient was diagnosed with a cholera infection with severe complications, severe electrolyte imbalances, and oliguria, acute kidney injury due to acute tubular necrosis secondary to dehydration or cholera infection itself. The complication of acute renal failure based on the increased level of serum creatinine up to 5.1 mg/dl and serum urea up to 116 mg/dl, due to the severe dehydration and hypovolemia, with a decrease in serum potassium to 1.8 mmol/liter (hypokalemia). The patient was anemic with 8.6 g/dl of hemoglobin (Hb) level of 8.6 g/dl and 24.7% of hematocrit (HCT), the leukocytosis happened with white blood cell (WBC) ($20.4 \times 10^3/\text{ul}$), and lymphopenia and neutrophilia were reported. The pharmaceutical and therapeutic care was carried out according to the national guideline, with blood transfusion and three times hemodialysis. The pregnant mother birthed a premature fetus with a tired status, unfortunately, the fetus passed away (death) within three days after birth. The cholera in pregnancy is highly concerned for the fetus's death. This reported case highlights the association between cholera and pregnancy, a condition that poses significant risks to both the fetus and the mother, necessitating prompt and appropriate management.

Keywords: Cholera, Pregnancy, Fetus, Hodeidah, Yemen.

1. Introduction

Cholera is a life-threatening diarrheal disease caused by infection with *Vibrio cholera* microorganisms [1]. It is rare in developed countries, prevalent in multiple areas of South and Southeast Asia and Africa, and may cause major outbreaks worldwide, caused by toxigenic serogroups of O1 and O139 *Vibrio cholerae* (*V. cholerae*) species, a curved Gram-negative bacillus. The key route of infection transmission is the fecal-oral route for ingesting contaminated food and water with cholera species [2].

Cholera infection may result in serious complications, including electrolyte imbalances, oliguria, and acute kidney injury resulting from acute tubular necrosis, either due to dehydration or the burden of the infection itself. Vulnerable individuals, including pregnant women, the elderly, immunocompromised individuals, and Individuals with low-income levels, face a greater likelihood of developing fatal cholera infections. [3]. *V. cholerae* O1 and O139 produce cholera toxin (CT), causing an excessive discharge of electrolytes and water, which can, in some cases, be fatal [4]. Cholera infections during pregnancy are linked to increased rates of fetal death, particularly in cases where the woman experiences severe dehydration [5]. Pregnant women are a major concern due to the high fatality rate associated with cholera, which leads to severe complications, increased maternal mortality, and adverse fetal outcomes such as miscarriage and preterm birth [6-8].

The risk factors for fetal death during cholera in pregnancy are closely related to the severity of the cholera episode, including dehydration at admission, the number of diarrhea episodes, the presence and frequency of vomiting, the volume of ringer's lactate administered during treatment, and the length of hospitalization [9]. However, factors typically associated with complicated pregnancies, including maternal age (either young or old) and the number of previous pregnancies or deliveries, were not linked to negative outcomes in cholera during pregnancy. The nature of the

relationship between cholera infection and pregnancy outcomes is still unclear, pregnant women are considered a vulnerable population when it comes to infectious diseases, as their immune systems are naturally suppressed to accommodate the developing fetus. Some studies analyses involving pregnant women still require further clarification regarding pregnancy outcomes [9,10]. This study focuses on identifying challenges, risk factors, and associations between cholera infection during pregnancy and fetal death, a clinical case report for epidemiological and clinical features of cholera-infected pregnant women and outcome in Hodeidah, Yemen.

2. Clinical Presentation

The Patient was received and assessed directly in the triage unit of the diarrhea treatment center (DTC) as isolation center in AL-Thawrah Public Hospital Authority, Hodeidah, Yemen. A 24-years-old female pregnant in their third trimester, developed acute watery diarrhea, experiencing 15 episodes per day, with severe vomiting, severe dehydration, sunken eyes, and fatigue as the major symptoms with SPO₂ are 96 % oxygen saturation, 22 imp respiratory rate (RR), 80/60 mmHg blood pressure and 92 Pulse rate (HR). The diagnostic laboratory investigation of complete blood count, stool examination, cholera rapid test, serum electrolyte, serum urea, and serum creatinine were carried out. The cholera infection was diagnosed clinically using laboratory methods; however, no additional confirmatory diagnostic tests were available for further investigation. The patient was diagnosed with a decreased hemoglobin level to 8.6 g/dl, with a hematocrit of 24.7%, an increase in white blood cells (leukocytosis) that was ($20.4 \times 10^3/\text{ul}$), lymphopenia (10%), neutrophilia (90 %), and normal platelets ($307 \times 10^3/\text{ul}$) were reported. The serum creatinine level was increased to 5.1 mg/dl, while the serum urea was 116 mmol/L, and the decrease of serum potassium electrolyte (hypokalemia) was reported (1.8 mmol/L). The patient diag-

nosis was reported and summarized in Tables 1 and 2. Upon admission, the patient received Ringer's lactate intravenous (IV) fluid and doxycycline tablet to address the infection and manage electrolyte imbalances (Table 3).

Table 1. Results of hematological parameters

Parameters	Value	Normal values ^[11-13]
RBC ($\times 10^3$ /uL)	3.1	4.50-6.50
Hb (g/dl)	8.6	12-15
Hematocrit (%)	24.7	35-45
WBC ($\times 10^3$ /ul)	20.4	3.5 $\pm$ 7.5
Neutrophil (%)	90	40-75
Lymphocyte (%)	10	20-45
Monocyte (%)	0	2-10
Eosinophil (%)	0	1-6
Basophil (%)	0	0-1
Platelets ($\times 10^3$ /ul)	307	150-450

Table 2. Results of biochemical parameters

Parameters	Value	Normal values ^[11,14]
Electrolyte: K+ mmol/L	1.8	3.5-5.5
Serum creatinine mg/dL	5.1	0.50 -1.10
Serum Urea mg/dL	116	15 - 45

Table 3. 40 % of IV rehydration solution in pregnant severe cases (plan C)

	First give 30 ml/kg in:	Then give 70 ml/kg in:
IV Ringer's lactate	30 minutes (repeat once if radial pulse is still very weak or non-detectable)	2 and half hours
Antibiotic	Doxycycline : 300 mg in a single dose.	
- Note 1: The case management of cholera included five steps : assessment of dehydration status, rehydration therapy, monitoring ,antimicrobial therapy and nutrition status - Note 2 : The pregnant women receives 40 % of the quantity of Intravenous (IV) rehydration with Ringer's lactate or similar balanced solutions is crucial for correcting hypovolemia. If unavailable, normal saline can be used temporarily. - Note 3: Oral rehydration solution (ORS) is essential once the patient stabilizes and can tolerate oral intake [15].		

3. Discussion

In cholera-endemic areas, pregnant women face increased risks of complications due to physiological changes during pregnancy that suppress their immune response resulting in dehydration and negatively impacting pregnancy outcomes [16]. Severe dehydration in cholera compromises placental blood flow, resulting in fetal hypoxia and acidosis correlated with a higher risk of adverse pregnancy outcomes, including fetal death, premature birth, and stillbirth, as complications for both the mother and fetus [17]. A 2013 study in Haiti showed a significant marked increase in fetal deaths among pregnant women affected by cholera, comparing data from 1969-1990 to 1991-2013, with a risk ratio (RR) of 5.7. Out of 263 pregnant women 21 (8%) pregnancies resulted in intrauterine fetal demise. In a 2011 Haiti study involving 900 pregnancies, 141 (16%) resulted in fetal death. Additionally, the death rate was found to be 3.8 times higher (95% CI: 2.1–7.1) compared with most other fetal deaths occurring in the last three months of pregnancy period [18], while another study in 2013, found that only 8 out of 21 fetal deaths occurred in the third trimester, with 10 occurring in the second trimester [19]. A 1960 study in Bangladesh found that half of the infected pregnant women with cholera had abortions in the final stage of pregnancy [20]. The higher incidence of fetal death may be attributed to the increased demand for placental blood flow during this period of pregnancy. In contrast, a 2015 meta-analysis indicated no significant

difference in the risk of fetal death across trimesters [21]. All studies examining the score of dehydration or hypovolemia have shown an association between dehydration severity and fetal loss. This relationship may be explained by the mechanism in which severe maternal dehydration leads to critical hypovolemia, compromising placental and fetal perfusion, ultimately resulting in severe fetal hypoxia and acidosis, which can lead to fetal death. Additionally, gastrointestinal bicarbonate loss could directly contribute to maternal acidosis. Determining the degree of dehydration in pregnancy is challenging, particularly in later stages, due to the increased plasma volume [22]. The loss of fluid through diarrhea and vomiting is high risk of underestimating the severity of dehydration during pregnancy. This highlights the critical need for prompt intervention and coordinated care in managing pregnant women with severe cholera complications.

4. Conclusion

Cholera during pregnancy poses a significant threat to fetal life and severe maternal dehydration due to the infection. Cholera significantly heightens the risk of adverse pregnancy outcomes, severe complications, and negative effects on the mother, and fetus including fetal death. However, there is insufficient data on cholera-infected pregnant women and the mechanisms underlying fetal death to inform specific recommendations for pregnancy-related care. Close monitoring of hydration status in pregnant women, along with access to comprehensive obstetric and neonatal services, can help prevent adverse maternal and fetal outcomes. However, further research is essential to understand the mechanisms of fetal death during cholera infection, accurately assess dehydration in pregnancy, and tailor treatment protocols for managing this high-risk group of cholera infection.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This work was conducted during our work at CTMID – Al Thawara Public Hospital Authority , Hodeidah, Yemen .

Ethical Approval

The studies involving human participants were reviewed and approved by Ethics Committee of Tropical Medicine and Epidemiology Studies of Hodeidah University (CTMES-HU) Hodeidah, Yemen .

How to Cite : Aldhamari, M., Alshawili, F., Shabah, A., Al-Kamarany MA. (2025). Fetal Death in Cholera Infected Pregnant Women: A Clinical Case Report. *Abhath Journal of Basic and Applied Sciences*, 4(1), 39-41.

References

1. Al Kamarany, M., & Ghouth, A. S. B. . (2024). The Ice Berge of Cholera in Hodeidah, Yemen: The Contact Exposure. *Studies in Medical and Health Sciences*, 1(1), 32–35. <https://doi.org/10.48185/smhs.v1i1.1169>.
2. El Hayek, P., Boueri, M., Nasr, L., Aoun, C., Sayad, E., & Jallad, K. (2023). Cholera Infection Risks and Cholera Vaccine Safety in Pregnancy. *Infectious diseases in obstetrics and gynecology*, 2023, 4563797. <https://doi.org/10.1155/2023/4563797>.
3. Vakrani, G. P., & Nambakam, T. (2021). Retrospective Study on Acute Kidney Injury among Cholera Patients in an Outbreak in Whitefield, Bengaluru. *International journal of nephrology*, 2021, 6682838. <https://doi.org/10.1155/2021/6682838>.
4. Richterman, A., Sainvilien, D. R., Eberly, L., & Ivers, L. C. (2018). Individual and Household Risk Factors for Symptomatic Cholera Infection: A Systematic Review and Meta-analysis. *The Journal of Infectious Diseases*, 218(suppl_3), S154–S164. <https://doi.org/10.1093/infdis/jiy444>.

5. Hashim, R., Khatib, A. M., Enwere, G., Park, J. K., Reyburn, R., Ali, M., Chang, N. Y., Kim, D. R., Ley, B., Thriemer, K., Lopez, A. L., Clemens, J. D., Deen, J. L., Shin, S., Schaetti, C., Hutubessy, R., Aguado, M. T., Kieny, M. P., Sack, D., Obaro, S., ... Jiddawi, M. S. (2012). Safety of the recombinant cholera toxin B subunit killed whole-cell (rBS-WC) oral cholera vaccine in pregnancy. *PLoS Neglected Tropical Diseases*, 6(7), e1743. <https://doi.org/10.1371/journal.pntd.0001743>.
6. Diop, S. A., Manga, N. M., Dia, N. M., Gaye, S., Ndour, C. T., Seydi, M., Soumare, M., Diop, B. M., & Sow, P. S. (2007). Cholera and pregnancy: epidemiological, clinical, and evolutionary aspects]. *Medicine et maladies infectieuses*, 37(12), 816–820. <https://doi.org/10.1016/j.medmal.2007.05.010>.
7. Tran, N. T., Taylor, R., Antierens, A., & Staderini, N. (2015). Cholera in Pregnancy: A Systematic Review and Meta-Analysis of Fetal, Neonatal, and Maternal Mortality. *PLoS one*, 10(7), e0132920. <https://doi.org/10.1371/journal.pone.0132920>.
8. Al Sheebani, S., Al-Kamarany, M. A., Ghouth, A. B., Kamal, A., & Alaaq, M. (2018). Acute renal failure induced by cholera: outbreak of Hodeidah, Yemen, 2017. *European Journal of Pharmaceutical and Medical Research*, 5(8), 188–192. https://www.ejpmr.com/home/abstract_id/4065.
9. Ciglenecki, I., Bichet, M., Tena, J., Mondesir, E., Bastard, M., Tran, N. T., Antierens, A., & Staderini, N. (2013). Cholera in pregnancy: outcomes from a specialized cholera treatment unit for pregnant women in Léogâne, Haiti. *PLoS Neglected Tropical Diseases*, 7(8), e2368. <https://doi.org/10.1371/journal.pntd.0002368>.
10. Amood Al Kamarany, M., & Alsharabi, B. A. (2024). Fetal Death in COVID-19 Infected Pregnant Women: A Clinical Case Report. *Abhath Journal of Basic and Applied Sciences*, 3(1), 24–26. <https://doi.org/10.59846/ajbas.v3i1.638>.
11. Al Kamarany, M. A., Majam, A., Suhail, K., Zuhairy, A., & Alabsi, E. (2023). Coronavirus Disease 2019 – Dengue Fever Coinfection: A Case Report. *International Journal of Pathogen Research*, 12(4), 27–32. <https://doi.org/10.9734/ijpr/2023/v12i4234>.
12. Al-Sheibani, S., Osman Taha, S., Balkam, F., Dhafash, A., & Amood Al-Kamarany, M. (2018). Validation Hematological Analyzer for Assay of Erythrogram in Hodeidah City, Yemen. *Asian Hematology Research Journal*, 1(1), 33–40. Retrieved from <https://journalahj.com/index.php/AHRJ/article/view/25>
13. Balkam, F. A., & Al-Kamarany, M. A. (2023). Hematological and Coagulation Features of COVID-19 Patients in Hodeidah, Yemen. *International Journal of Pathogen Research*, 12(6), 46–54. <https://doi.org/10.9734/ijpr/2023/v12i6252>
14. Dosoo, D. K., Kayan, K., Adu-Gyasi, D., Kwara, E., Ocran, J., Osei-Kwakye, K., Mahama, E., Amenga-Etego, S., Bilson, P., Asante, K. P., Koram, K. A., & Owusu-Agyei, S. (2012). Hematological and biochemical reference values for healthy adults in the middle belt of Ghana. *PLoS one*, 7(4), e36308. <https://doi.org/10.1371/journal.pone.0036308>.
15. National Guideline for Acute Watery Diarrhea Control (Cholera) (2024). Ministry of Public Health and Population, Yemen
16. Khan, A. I., Islam, M. T., & Qadri, F. (2017). Safety of oral cholera vaccines during pregnancy in developing countries. *Human vaccines & immunotherapeutics*, 13(10), 2245–2246. <https://doi.org/10.1080/21645515.2017.1356525>.
17. Hirschhorn, N., Chowdhury, A. K., & Lindenbaum, J. (1969). Cholera in pregnant women. *Lancet* (London, England), 1(7608), 1230–1232. [https://doi.org/10.1016/s0140-6736\(69\)92115-1](https://doi.org/10.1016/s0140-6736(69)92115-1).
18. Schillberg, E., Ariti, C., Bryson, L., Delva-Senat, R., Price, D., GrandPierre, R., ... Lenglet, A. (2016). Factors Related to Fetal Death in Pregnant Women with Cholera, Haiti, 2011–2014. *Emerging Infectious Diseases*, 22(1), 124–127. <https://doi.org/10.3201/eid2201.151078>.
19. Ali, M., Nelson, A., Luquero, F. J., Azman, A. S., Debes, A. K., M'bang'ombe, M. M., Seyama, L., Kachale, E., Zuze, K., Malichi, D., Zulu, F., Msyamboza, K. P., Kabuluzi, S., & Sack, D. A. (2017). Safety of a killed oral cholera vaccine (Shanchol) in pregnant women in Malawi: an observational cohort study. *The Lancet. Infectious diseases*, 17(5), 538–544. [https://doi.org/10.1016/S1473-3099\(16\)30523-0](https://doi.org/10.1016/S1473-3099(16)30523-0)
20. El Hayek, P., Boueri, M., Nasr, L., Aoun, C., Sayad, E., & Jallad, K. (2023). Cholera Infection Risks and Cholera Vaccine Safety in Pregnancy. *Infectious diseases in obstetrics and gynecology*, 2023, 4563797. <https://doi.org/10.1155/2023/4563797>.
21. Richterman, A., Sainvilien, D. R., Eberly, L., & Ivers, L. C. (2018). Individual and Household Risk Factors for Symptomatic Cholera Infection: A Systematic Review and Meta-analysis. *The Journal of Infectious Diseases*, 218(suppl_3), S154–S164. <https://doi.org/10.1093/infdis/jiy444>.
22. Wierzba T. F. (2019). Oral cholera vaccines and their impact on the global burden of disease. *Human vaccines & immunotherapeutics*, 15(6), 1294–1301. <https://doi.org/10.1080/21645515.2018.1504155>