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Cholera infection risk in a pregnant woman in Tanzania: A case report

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Abstract

Introduction: Cholera outbreak continues to threaten the lives of people of all age groups mainly in developing countries with segments of the population being more vulnerable notably pregnant women. Between 2014 and 2021, Africa accounted for 21% of Cholera cases and 80% of deaths reported globally.

Case report: N.B.M 27-year-old female, housewife, gravida two para one living zero (G2P1-L0), Last Normal Menstrual Period (LNMP) 25/07/2023, Expected Date of Delivery (EDD) 01/05/2024, Gestation Age (GA) 24 weeks by date. A known case of type 1-Diabetes Mellitus (DM) was diagnosed eight years ago on insulin for five years. She was receiving treatment for cholera at IHAPA Cholera Treatment Center (CTC), in Shinyanga region, Tanzania after contracting vibrio cholerae during an outbreak in her area. She showed cholera-related symptoms and subsequently tested positive for vibrio cholerae through rapid test and culture methods. Initially, she presented with a one-day history of passing loose stools, general body weakness, abdominal pain, audible bowel sounds, and two episodes of non-projectile and non-blood-stained vomiting. The management of this case was mainly guided by the initial diagnosis of cholera with some dehydration, threatened abortion, and Diabetes Mellitus (DM). She was kept on Intravenous (IV) fluids with Ringer's Lactate (RL) alternating with Normal Saline

(NS), Erythromycin 500 mg orally as per Tanzania standard treatment guidelines for cholera in pregnant women. She was also provided with paracetamol (PCM) 1 gm orally three times a day, and Oral Re-hydration Solution (ORS) at 500 ml per episode. The patient was also kept on Zinc sulfate 20 mg orally once a day and insulin therapy for diabetic mellitus. Ultrasound was done and revealed a single live intrauterine pregnancy at 25 weeks and 6 days. The placenta was located posteriorly, with an Amniotic Fluid Index (AFI) of 15.7 cm, Estimated Fetal Weight (EFW) of 785 grams, cervical os was open and the provisional diagnosis of inevitable abortion was reached and managed by non-invasive procedures. In the course of the illness, the case developed spontaneous abortion, which was managed with a non-invasive procedure under strict infection prevention and control measures.

Conclusion: We documented a case of a pregnant woman who contracted Vibrio cholerae, exhibiting symptoms compatible with cholera, confirmed through both a positive cholera rapid test and subsequent positive on culture. We recommend early management of pregnant women of reproductive age who contract cholera, and Cholera Treatment Units (CTUs) should be equipped with facilities and resources for managing emergency pregnancy complications.

Keywords: Cholera; Pregnant women; Abortion; Case report; Tanzania.

Abbreviations: FBG: Fasting Blood Glucose; Hb: Haemoglobin; IPC: Infection Prevention and Control; IV: Intravenous; MRDT: Malaria Rapid Diagnostic Test; CTC: Cholera Treatment Center; CTU: Cholera Treatment Unit; UPT: Urinary Pregnancy Test; UTI: Urinary Tract Infection; RR: Respiratory Rate; BP: Blood Pressure; PR: Pulse Rate; SO_2: Oxygen saturation; DM: Diabetic Mellitus; AFI: Amniotic Fluid Index.

Introduction

Cholera continues to affect many countries causing morbidity and mortality among the populations [1]. It is an old disease mostly affecting developing countries, many of which are in Africa [2,3]. Between 2014 and 2021 Africa accounted for 21% of cholera cases and 80% of deaths reported globally [4]. In several African countries, cholera is the leading cause of severe diarrhoea. In 2021, the World Health Organization reported that Africa experienced its highest ever reported numbers more than 137,000 cases and 4,062 deaths in 19 countries. Cholera has persisted in Africa partly because of worsening sanitation and hygiene practices leading to water and food contamination, poor and unreliable safe water supplies and worsening socioeconomic conditions [1,2,5]. In addition, in the last decade, many African countries have witnessed an upsurge in population migration to urban areas in search of livelihoods [6]. Many of these people end up in poor urban slums where water and sanitation infrastructure remain a challenge. Displaced populations and unregulated movements are major concerns in several African countries [5,6]. Including Tanzania. Over the past four decades, Tanzania has faced five large cholera epidemics [9,11]. These occurred in 1977, resulting in 1,671 cases and 135 deaths, with a Case Fatality Rate (CFR) of 8.7%. In 1992, there were 18,526 cases and 2,173 deaths, marking the highest CFR of 11.7% ever recorded in the country. The subsequent epidemics took place in 1997 (40,226 cases, 2,268 deaths, CFR of 5.6%), 2006 (14,297 cases, 254 deaths, CFR of 1.8%), and the period from 2015 to 2018 (33,318 cases, 550 deaths, CFR of 1.7%), followed by the 2019 outbreak with 381 cases and 6 deaths, resulting in a CFR of 1.6%. Since the initiation of the Integrated Disease Surveillance and Response (IDSR) strategy in the country between 1998 and 2010, a total of 88,235 cases and 2,416 deaths have been reported, translating to a CFR of 2.7%. Notably, the 1992 outbreak still holds the record for the highest CFR in Tanzania's cholera history.

The Ministry of Health (MoH), as per the STAR assessment of 2022, designates the cholera-risk season to fall between December and March. While cholera cases have been documented in all 26 regions of the country, nine of them, namely Dar es Salaam, Dodoma, Kigoma, Lindi, Mbeya, Morogoro, Mtwara, Pwani, and Tanga, have reported more than 2000 cumulative cases. In August 2023, the Tanzania Meteorological Authority (TMA) issued an official alert, indicating the likelihood of above normal to normal rainfall in 10 regions of the country, including Kagera, Geita, Mwanza, Shinyanga, Simiyu, Kigoma, Dar es Salaam, Tanga, Pwani, and Morogoro [12]. Additionally, five regions, namely Mara, Simiyu, Arusha, Manyara, and Kilimanjaro, were anticipated to experience normal to above-normal rainfall from September to December 2023, with a possibility to extend to early January in 2024. The forecasted impacts included an

elevated risk of water-borne diseases, including cholera, attributed to a potential lack of safe water sources and the possibility of flooding leading to disruptions in toilet infrastructure and contamination of water sources. From September 2023 to January 2024, several regions in the country have been experiencing cholera outbreaks. By the end of 1st week of January 2024, there were 852 cholera cases reported with 26 deaths (CFR 3.2%) from Mara, Kigoma, Kilimanjaro, Arusha, Singida, Dodoma, Tabora, Shinyanga, Simiyu, Kagera, Geita, Katavi, Mwanza and Ruvuma. In efforts to prevent and control cholera, the MoH has deployed several interventions including: risk-based surveillance, Water, Sanitation and Hygiene (WASH), risk communication and community engagement, infection prevention and control and case management. Among the vulnerable groups are the pregnant women when they are especially severely dehydrated. Cholera infection poses a significant risk during pregnancy, potentially resulting in elevated rates of stillbirths and neonatal mortality, [13,14]. Research indicates there is no variation in gestation age that fetal demise is more prevalent, as pregnant women afflicted with cholera often experience spontaneous abortions [15]. Even after adjusting for various confounding factors like maternal age, dehydration, and vomiting, these findings persisted. Neonatal fatalities are primarily linked to congenital malformations and consistently low Apgar scores, showing no signs of improvement. Here we report a cholera detection in a pregnant woman and management processes and outcomes.

Case description

N.B.M: 27-years-old female, house wife, G2P1-L0, LNMP 25/07/2023, EDD 01/ 05/ 2024, GA 24weeks by date. A known case of type 1-DM diagnosed 8 years ago on insulin for five years. She was receiving treatment for cholera at IHAPA Cholera Treatment Center (CTC) in Shinyanga, Tanzania.

Case history: The patient presented to cholera treatment center with a one-day history of passing loose stools, experiencing five episodes characterized by watery and whitish, fishy odor and containing greenish material and mucous. The stools were large in volume and non-blood stained. Other symptoms included general body weakness, abdominal pain, audible bowel sounds, and two episodes of non-projectile and non-blood stained vomiting.

Furthermore, there was a history of a low-grade fever for one day and non-periodic pattern. On a further probing, the patient did not report history of convulsions, loss of consciousness, dizziness, or blurred vision, but a history of sporting. There is no gynecological history but has had an obstetric history of pregnancy resulting in the delivery of a baby at term; however, unaware of the underlying reason for the loss.

Physical examination results: On examination, the patient was fully conscious but weak, and febrile with a body temperature of 38°C, Respiratory Rate (RR) 18 cycles per minute, Blood Pressure (BP) 82/54 mmHg, Pulse Rate (PR) 115 beats per minute, and Oxygen saturation (SO_2) 97% at room air. The abdomen was soft with supra pubic tenderness. The liver and spleen were not palpable. Other body systems were essentially normal. The patient hydration status indicated Lethargic, drinks eagerly, skin pinch goes back slowly, sunken eyes and dry mucous membranes.

Investigations and results: A comprehensive history and physical examination led to a provisional diagnosis of cholera with some dehydration, a potential threat of abortion in the second trimester of pregnancy, Diabetes Mellitus (DM), with consideration for malaria and urinary tract infection. Decisions were made to carry out a rapid cholera test, and other laboratory examinations were undertaken, which included urine deep stick, a malaria rapid test, culture and sensitivity testing for cholera, fasting blood glucose, HIV rapid test, hemoglobin, urine for pregnancy test and obstetric ultrasound. The results are summarized in Table 1.

Table 1: Patient's laboratory test results.

SN	Test	Results
1	Urine deep stick	No ketone, protein +, no nitrate
2	Malaria Rapid Test (MRDT)	Negative
3	Hemoglobin (Hb)	10.5 gm/dl
4	HIV rapid antigen test (Bioline)	Negative
5	Cholera rapid test	Positive
6	Fasting Blood Glucose (FBG)	9.8 mmol/l
7	Cholera culture and sensitivity	Positive
8	Urine Pregnancy Test (UPT)	Positive

Treatment: Following the initial diagnosis of cholera with some dehydration, a potential threat of second-trimester abortion, and DM, the patient was subjected to a treatment plan. This included Intravenous (IV) fluids with Ringer's Lactate (RL) alternating with Normal Saline (NS). Additionally, Erythromycin 500 mg was administered orally as per the Tanzania standard treatment guideline for cholera in pregnancy. She was also provided with paracetamol (PCM) 1 gm orally three times a day, and Oral Rehydration Solution (ORS) at 500 ml per episode. The patient was also kept on Zinc sulfate 20 mg orally once a day and encouraged to maintain adequate fluid intake and insulin therapy for DM were given. A gynecology consultation was made as part of the comprehensive care plan. On the second day of her illness, the gynecologist a reviewed the patient. The patient persisted in presenting with the initial symptoms of vomiting and diarrhea with milky appearance resembling water in which rice has been rinsed. She also reported experiencing vaginal bleeding, which was described as fresh, accompanied by clots, and required changing of pads at least three times in a day. Each pad was partially soaked with blood. Crucially, the vaginal bleeding was not linked to lower abdominal pain or waist ache. The patient did not report any positive history of curd-like vaginal discharge. After the gynecology review, the management plan included complete bed rest, starting with Duphaston tablets at 40 mg then continuing at 10 mg twice daily. Tranexamic acid 1 gm start then 500 mg three times a day. The patient was maintained on IV fluids and encouraged to continue oral fluid intake, and Erythromycin. Additionally, IV Ceftriaxone 1 gm once daily for 3 days was administered, along with oral Zinc at 20 mg once daily. Patient was also instructed to continue with ORS and insulin as prescribed during initial management. The plan was to conduct a follow-up review after obtaining results from the ultrasound scan. Six hours later on the second day, the gynecologist recommended a follow-up review of the patient, who continued to experience episodes of vaginal bleeding without significant fluid leakage. She reported intermittent abdominal pain with cramping, but fetal movement remained positive. On examination, the patient was alert, in fair condition, not pale, afebrile, with vital signs showing a blood pressure of 98/69 mmHg, a pulse rate of 102 beats per minute, oxygen saturation of 98% on room air, a respiratory rate of 18 cycles per minute, and a temperature of 36.9°C. Abdominal assessment revealed four contractions persisting for 40 seconds each, and fetal heart

rate is at 124 beats per minute. Pelvic examination indicated a fully dilated cervix at 10 cm with intact membranes. Ultrasound results confirmed a single live intrauterine pregnancy at 25 weeks and 6 days. The placenta located posteriorly, with an Amniotic Fluid Index (AFI) of 15.7 cm, Estimated Fetal Weight (EFW) of 785 grams, dilated cervical os and the provisional diagnosis of inevitable abortion was reached. After provisional diagnosis of inevitable abortion, the management plan included awaiting spontaneous expulsion. A large bore cannula was to be inserted, and one unit of blood was prepared for a potential blood transfusion. The patient received counseling regarding what to anticipate during the expulsion process and any other required medical interventions.

After two hours of review, the gynecologist examined the patient who presented with clamping abdominal pain progressively lasting 30 to 40 seconds. Intravenous Oxytocin at a dose of 20 IU in 500 ml Ringer's Lactate was administered. The products of conception, comprising the placenta and its membrane, were completely expelled within 40 minutes. The uterus was massaged and well-contracted, with an estimated blood loss of 150 ml. Her vital signs included a blood pressure of 102/72 mmHg, pulse rate of 102 beats per minute, oxygen saturation of 98% on room air, respiratory rate of 20 breaths per minute, and a temperature of 36.6 degrees Celsius. Abdominal examination showed a fundal height consistent with the gestational age, with a well-contracted uterus and minimal post-vaginal delivery bleeding diagnosis of cholera with no dehydration, complete abortion, and Type 1 DM was again reached and the plan of management was to continue with ORS and insulin as prescribed during initial management and post- abortion care. On the third day of admission, the patient reported reduced bowel movements, having only one motion overnight and one in the morning, both with small volume. However, urine output was adequate, and there were no reports of vaginal bleeding or fever. Upon reexamination of the patient during this period, she was alert, not pale, afebrile, and no signs of respiratory distress or jaundice. Vital signs were stable with a blood pressure of 100/70 mmHg, pulse rate of 80 beats per minute, oxygen saturation of 98% on room air, respiratory rate of 19 breaths per minute, and a temperature of 36.2 degrees Celsius. Hydration status was scored good as the patient drank normally, skin pinch goes back normally, and there were no sunken eyes, with wet mucous membranes, which initially observed.

Abdominal examination revealed a symmetrical abdomen moving with respiration, soft, non-tender on both superficial and deep palpation, with no masses or organ enlargement noted. Bowel sounds were exaggerated, and a tympanic note was present. Pelvic examination showed a closed cervix with scanty blood staining on the finger. The patient was kept on zinc sulfate tablets (20 mg once a daily), loperamide tablets after each motion, and insulin injections and ORS was recommended after each bowel movement. Post-abortion care included encouraging adequate fluid intake. The final diagnosis was cholera with no dehydration, complete abortion and type 1-DM.

Outcome: The patient's symptoms resolved and the final diagnosis reached was, cholera with no dehydration, complete abortion under post-abortion care and type 1-DM, she was then discharged from the CTC.

Follow up: After discharge the patient was advised to continue post-abortion care, to ensure adequate hydration, nutritional support, and regular medical check-ups to monitor recovery and prevent cholera recurrence.

Discussion

This case report records and describes the cholera detection in pregnant woman during cholera outbreak in Shinyanga region, Tanzania. The impact of cholera infection in pregnancy raises substantial concerns, with potential repercussions including heightened occurrences of stillbirths and neonatal mortality [15,16]. Similar to other reports, our case initially presented with a one-day history of frequently passing loose stools resembling water in which rice has been rinsed, general body weakness, abdominal pain, audible bowel sounds, and two episodes of non-projectile and non-blood-stained vomiting, which are compatible with cholera [17]. The management to our case was mainly guided by initial diagnosis of cholera with some dehydration, threaten abortion, and DM. The patient was kept on a treatment plan, that IV fluids with Ringer's Lactate (RL) alternating with Normal Saline (NS). Additionally, she was prescribed with Erythromycin 500 mg orally as per Tanzania standard treatment guideline for cholera in pregnancy, Paracetamol (PCM) 1 gm orally three times a day, and Oral Rehydration Solution (ORS) at 500 ml per episode. The patient was also kept on Zinc sulfate 20 mg orally once a day and encouraged to maintain adequate fluid intake and insulin therapy for DM. Ultrasound was done and revealed a single live intrauterine pregnancy at 25 weeks and 6 days. The placenta was located posteriorly, with an Amniotic Fluid Index (AFI) of 15.7 cm, Estimated Fetal Weight (EFW) of 785 grams, and the provisional diagnosis of inevitable abortion was reached and managed by noninvasive procedures. Cholera infections often result in fetal loss, with or without maternal death, and the case fatality rate associated with symptomatic maternal cholera varies, ranging from 6.0% (95% confidence intervals 1.9-13.9) in Peru/Saona (1991) to 11.5% (95% confidence intervals 4.2-25.1) in Senegal (2006). In the period from 1969 to 1990, fetal death rates were notably higher, hovering around 30%, with rates of 32.8% in Nigeria (95% confidence intervals 20.0-50.6), 33.3% in Pakistan (95% confidence intervals 20.4-51.5), and 30.4% in India (95% confidence intervals 23.0-39.5). According to the literature, severe dehydration resulting from cholera infection can significantly impact the course of pregnancy, leading to devastating outcomes for both the mother and the baby [15,16,18]. Instances of stillbirths and spontaneous miscarriages have been documented following severe maternal dehydration and diarrhea caused by cholera infection.

Conclusion

We documented a case of cholera in a pregnant woman during cholera outbreak in Tanzania. The case was infected with vibrio cholerae following a history of outbreak at her area and presented with cholera-related symptoms with positive cholera rapid test followed by a positive culture. In the course of the illness, she developed spontaneous abortion, which was managed with non-invasive procedure under strict infection prevention and control measures. This case study contributes to the body of literature to document cholera case and management outcome in pregnant women. We recommend early management of pregnant women of reproductive age who get cholera, and cholera treatment unit should be equipped with facilities and resources for managing pregnancy complications. Also, during disease outbreaks such as cholera, assessment of pregnancy and perinatal health should be part of the interventions and be integrated in the respective outbreak disease surveillance [19].

Declarations

Consent for publication: Written informed consent was obtained from the patient for publication of this case report.

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Conflict of interest: The authors declare no conflict of interest related to this publication.

Authors' contribution: Michael Kiremeji, managed the patient during the outbreak and drafted the manuscript; Augustino Maufi managed the patient and contributed in manuscript writing, Eliudi Eliakimu, Angela Samweli, Elias Kwesi, Janeth Masuma, Augustino Maufi, Calvin Sindato, Joseph Hokororo, Ntuli Kapologwe, Saidi Kilindimo, Juma Mfinanga, Hendy Sawe, Stephen Kibusi, Pius Horumpende, Grace Magembe, and Tumaini Nagu critically reviewed and contributed to the manuscript. All authors read the final draft of the manuscript and approved publication.

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