ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
DEPARTMENT OF EMERGENCY AND CRITICAL CARE MEDICINE

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Title: Severity of dehydration and Associated Factors of Patients Admitted to Cholera Treatment Centers in Two Selected Government Hospitals, Addis Ababa, Ethiopia.

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Declaration

I, Kokeb Getahun, hereby declare that this thesis titled “Severity of dehydration and Associated Factors of Patients Admitted to Cholera Treatment Centers in Two Selected Government Hospitals, Addis Ababa, Ethiopia” is a record of work carried out by me under the supervision of Dr. Yohannes Feleke and Dr. Lemlem Beza.

I confirm that the work presented in this thesis is original and has not been submitted for any other degree or diploma. All source of information have been acknowledged. I also affirm that I have complied with all the ethical standards for research.

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Acknowledgment

I would like to acknowledge my advisors, Dr Yohannes and Dr Lemlem for their guidance and support throughout the research process. I would like to acknowledge Addis Ababa University for providing the resources for this study. I would like to express my gratitude to the Department of Emergency Medicine and Critical Care for providing me with the resources. I would also like to acknowledge the staff who worked at the isolation centers in Black Lion and Zewditu Memorial Hospital for their cooperation. In addition, I would also like to Thank Faculty members and my colleagues for their generosity and encouragement.

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Abbreviations/Acronyms

AKI- Acute Kidney Injury

AOR- Adjusted Odds Ratio

CDC- Center for Disease control

CI- Confidence Interval

CKD- Chronic Kidney Disease

COPD- chronic obstructive pulmonary disease

DM- Diabetes Mellitus

RVI- Retroviral infection

SD- Standard Deviation

SPSS- Statistical Package for Social sciences

TASH- Tikur Anbessa Specialized hospital

WHO- World Health Organization

ZMH- Zewditu Memorial Hospital

Abstract

Introduction: Cholera is an acute illness caused by gram-negative bacteria, *V. cholerae.* Water is the main source of contamination. It's transmitted via the faecal-oral route. It's characterized by acute severe diarrhea and vomiting, which leads to dehydration. If dehydration is not addressed immediately, it can lead to complications such as shock, renal failure, and death. By investigating the severity of dehydration, this research could potentially identify risk factors that may affect patient outcomes. The objective of this study is to assess the severity of dehydration and associated factors among cholera patients admitted to Tikur Anbessa and Zewditu Memorial Hospital.

Methods: Retrospective chart review of patients admitted to cholera treatment centers at Tikur Anbessa and Zewditu Memorial Hospitals. Socio-demographic characteristics, symptoms, hydration status, complication and length of stay were collected from the patient chart that met inclusion criteria using Kobo Toolbox. Data was analyzed using SPSS version 20, descriptive statistics summarized the data, and ordinal logistic regression assessed the relationship between independent variables with outcome variable (dehydration severity)

Results: There were 143 patients that were included. The median (IOR) age was 39 years (25.0-57.0), and 53.8% (77) of the patients were males. In this study, 37.8 % (54) of the patients had severe dehydration while, 21% (30) and 41.4% (59) of the patients had no and some dehydration, respectively. Patients who are females (AOR = 2.134, 95% CI: 0.135-1.544 p=0.02) and had co morbid illnesses (AOR = 4.105, 95% CI: 0.571-2.255 p=0.001) were at greater risk of developing severe dehydration, while having contact history was associated with lesser degree of having severe dehydration (AOR= 0.272, 95% CI: -2.575- -0.023 p=0.04). For one year increment in age, the severity of dehydration decreases by 0.978 times.

Conclusion: The study highlights significant risk factors for severe dehydration in cholera patients, particularly gender and comorbid conditions. These findings underscore the importance of targeted interventions in managing cholera outbreaks and improving patient outcomes.

Keywords: Cholera, Cholera Outbreak, Severity of Dehydration, Addis Ababa Ethiopia.

1. Introduction

1.1. Background

Cholera is an acute diarrheal illness that is caused by an infection with *Vibro cholerae* (1). If untreated, it can lead to death in a few hours (1). It has been responsible for 7 deadly pandemics and has caused much suffering over the last two centuries (2). It continues to be a global threat to the general public (1). Poor living conditions and poor socioeconomic status contribute to the diseases. This includes inadequate water supply in terms of quantity and quality, poor access to sanitation areas, poor hygiene practices, famine, overcrowding, and war (3). Cholera can be endemic in areas where there have been confirmed cases during the past 3 years, and an epidemic can occur in endemic areas and in other countries that do not typically encounter the disease (1).

According to WHO, it is estimated that there are between 1.3 and 1.4 million cases each year, with more than 20,000 to 144,000 deaths reported (1). As of January 31, 2024 report, there were more than 700,000 and more than 40,000 deaths that were reported in the year 2023. These cases were reported from 30 countries and the majority of the countries are from Africa. (5).

Ethiopia is one of the countries in Africa that has reported the highest number of cases. The outbreak started in August 2022 in the Oromia Region and later spread to other parts of the country. As of January 2024, Ethiopia has reported a total of 32,548 cases and 488 deaths with a case fatality of 1.5 % (5). The outbreak remains active in some parts of the country. This is due to excessive rainfall that has resulted in flooding, which has made access to clean water difficult. Due to ongoing security issues, the outbreak has spread to refugee camps and the displaced population. These difficulties are further exacerbated by inadequate access to healthcare facilities (5).

Patients who are infected with the bacteria might not develop the disease, while others can have mild to moderate symptoms. A small number of patients can develop severe symptoms, which puts them at risk for death (1). Its incubation period can last up to 5 days. The illness can start

rapidly with acute profuse diarrhea and vomiting can sometimes be a presenting symptom. Some patients can have associated symptoms such as loss of appetite and abdominal pain (9).

Depending on the severity of the illness, patient's can have different levels dehydration (13). Patients with some dehydration have increased thirst, dry mouth and tongue, absence of tears, and sunken eyeballs. While patients with severe dehydration have a weak pulse, are lethargic, are unable to take oral fluids, and have a skin pinch that goes back very slowly (14). Patients with severe dehydration can also have weight loss (13).

In extreme cases, severe dehydration can be fatal within 6-12 hours of the onset of the symptoms, particularly if rehydration therapy is not administered immediately. Notable consequences of dehydration include electrolyte disturbance, primarily hypokalaemia and hypernatremia as well as hypoglycemia due to insufficient hepatic gluconeogenesis. Organ hypo perfusion can also occur due to severe dehydration resulting in shock and acute tubular necrosis. Metabolic acidosis can also result from volume depletion (18).

1.2. Statement of the Problem

The current cholera outbreak is one of the longest outbreaks recorded (5). There are still millions of people who are at risk of the infection. According to WHO's external situation report released in February 2024, the cholera outbreak is now classified as a grade 3 emergency (4). In areas where the outbreak has been declared controlled, there is still the risk of recurrence. In Ethiopia, the current outbreak has persisted due to recent unrest and extreme weather conditions. In the meantime, inadequate access to clean water and poor sanitation practices contribute to its persistence. There is also a shortage of cholera vaccine (6).

Patients infected with V. cholerae can present with different signs and symptoms. Some patients can be asymptomatic while others would present with voluminous diarrhea. The reason for the range of clinical manifestations can be attributed to the patient's immune status, blood group, or nutritional status (2). Patients can also have associated symptoms such as vomiting and muscle cramps due to electrolyte disturbance, though fever is usually absent (2).

Patients can have different stages of dehydration depending on the amount of fluid loss. With losses of up to 10 percent, patients would have fatigue, palpitations, and orthostatic hypotension. With loss exceeding 10 percent, patients would have decreased urine output, weak pulse, sunken eyeballs, and wrinkled skin followed by lethargy and coma (2). Complications arise from fluid loss and electrolyte disturbance.

Globally, outbreaks of cholera cause significant morbidity and mortality. One of the major consequences of cholera is dehydration, which can have a significant impact on the patient's outcome. Several studies have highlighted complications that are potentially linked with dehydration during pervious outbreaks (11)(12)(13). However, the current understanding of factors associated with severity of dehydration in cholera patients remains limited. The existing knowledge gap restricts actions that help prevent and treat dehydration effectively, which potentially leads to poor patient outcomes. Therefore, this study aims to investigate the severity of dehydration and its associated factors.

1.3. Significance of the study

Worldwide, cholera remains a major threat to public health. Severe dehydration and its complications can have a direct impact on patient's outcomes, including prolonged length of stay and mortality. It is important to understand the factors associated with the severity of dehydration in cholera patients for several reasons. These include better clinical treatment, improved public health strategies and reduction in morbidity and mortality.

The purpose of this study is to identify risk factors that put patients at risk for dehydration, to establish if pre-existing co-morbidities affect the severity of dehydration, potential complications that arise from the disease. By gaining insights from the above areas, health care providers can develop targeted therapies for their patients by identifying the major risk factors that contribute to severe dehydration. These targeted therapies can include enhanced monitoring, early administration of rehydration therapy, addressing co morbidities and prevention of complications. Understanding associated factors with the development of severe dehydration can also enforce public health strategies that prevent cholera outbreaks. These include targeting populations that are particularly at higher risk of developing severe dehydration and providing access to clean

water, sanitation facilities, promoting hygiene practices, prioritization of vaccination programs and resource allocation. The above mentioned interventions drastically minimize the complications, reduce the length of stay, and spare lives.

In conclusion, the study has the potential to improve patient management, enhance public health strategies, and reduce morbidity and mortality.

2. Literature Review

Cholera, derived from the Greek word “Chole” or bile, is used to describe gastrointestinal disease, an acute illness responsible for several pandemics (2). The precise history of cholera outbreaks during ancient times is unknown but some evidence shows that it was endemic in India (11). The first global pandemic started in India in the 19th century (1). There have been 7 pandemics and it still remains a public health threat to developing countries. The disease later spread to other countries and subsequently, there have been six global pandemics that killed millions of people (1).

According to the WHO, the current outbreak started in the Oromia region and later spread to other parts of the country. There were more than 700,000 cases which were reported including more than 4000 deaths in 2023. The above cases were reported across 30 countries. 17 African countries reported the outbreak. Ethiopia was one of the few countries that reported the highest number. As of January 2024, Ethiopia has reported more than 30,000 cases and 488 deaths with a case fatality rate of 1.5% (4).

In a study done in Yemen, during the 2017 outbreak, 172 patients were treated in 2 hospitals. Of the above patients, 69.2 percent of the patients were males and 73.3 % of the patients were between the ages of 15 and 49. Most (93.3 %) patients live in urban areas and almost all (98%) have access to water. More than 75 % of the patients have access to the toilet and one-third of the patients report washing their hands with soap and water (13). In a retrospective study done in Sierra Leone during the 2012 epidemic, 798 patients were admitted to the cholera wards. Out of those patients, 55.5 % of the patients were women, 74.4 % of the patients were younger than 35 years of age, and elderly patients accounted for 5.5% of the population (14).

In another study done in Ethiopia from 2019 to 2020, 55 % of the patients were male and 52 % patients were aged between 15-44 years (15). In a case-control study done in Addis Ababa, Ethiopia during the 2017 outbreak, 25 cases were identified and more than two third of the cases were diagnosed based on case definition. All of the cases were admitted to treatment centers.

In the study done in Yemen, 94.8 % of the patients were severely dehydrated while the others had moderated dehydration (13). In Sierra Leon out of the 798 patients, 80 had documentation for severe dehydration and 17 % of the patients had either mild or no dehydration (14). In another study done in Oromiya, among 950 patients, 58% of the patients had severe dehydration while 12.7 % and 29.2 % of the patients had no and some dehydration respectively (20). In the same study, it was found that the sex and age of the patients did not have a significant association with dehydration. While having contact and travel history, laboratory tests and treatment did have an association with dehydration status (20).

Regarding the complication of cholera, in a study done in a tertiary hospital in Bangalore during the outbreak in 2020, 78 % of the patients had developed AKI and 32.7 % of the patients had metabolic acidosis. Among the patients who had developed AKI, the mean age was 34.16 and 69.8% of the patients were men. Diabetes Mellitus was noted in 9.3% of the patients (19). In a study done in Kenya, 60.6% of the participants were diagnosed with AKI while 26.8% and 40.2% had hypokalemia and Hyponatermia.

The length of stay in the Sierra Leone study was short with 71.3 % of the patients remaining in the isolation wards for 2 days (14). In contrast, almost all patients in the Yemen study stayed in the isolation centers for more than 2 days (13).

The case fatality in Nigeria was 1.97% and the highest proportion of the patient that died was between the ages of 2- 5 years. In the same study cholera related cases were higher in males and it was associated with an infection that occurred during the rainy season and in areas that had flooding. Additionally, health-seeking more than 2 days after the onset of illness and home management was associated with increased cholera-related deaths (17). There were 18 deaths in Sierra Leone during the 2012 outbreak (14).

In the study done in Ethiopia during the 2019 outbreak, patients who had some or severe dehydration were less likely to survive than those patients who had no dehydration (16). And also the odds of surviving after oral rehydration therapy was 1.579 more than no treatment while the odds of surviving after IV fluids was 1.608 times more than no treatment (16). There were no deaths in the case-control study done in Addis Ababa (9).

3. Conceptual framework

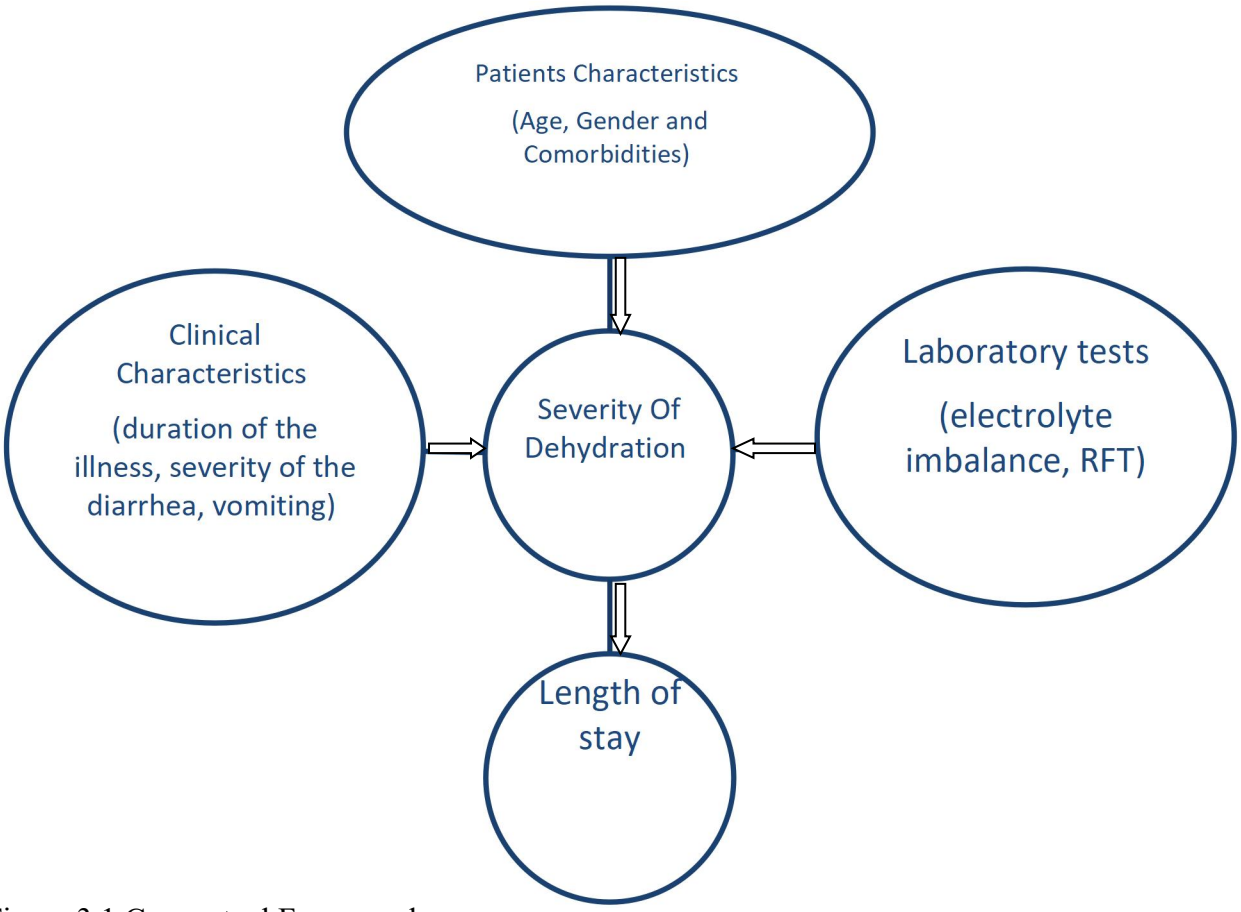


Figure 3.1 Conceptual Framework

4. Objectives of the study

4.1 General objectives

To assess the severity of dehydration and associated factors among patients admitted to cholera treatment centers in TASH and ZMH

4.2 Specific objectives

- To assess the severity of dehydration
- To identify the associated factors

5. Methods and Materials

5.1 Study design, setting, and period

5.1.1 Study setting

This study was conducted in TASH and ZMH, which are both located in Addis Ababa, Ethiopia. TASH is the largest referring hospital in the country. Its currently under Addis Ababa University. It employs 200 doctors and more than 300 nurses with 115 other health care professionals. It also has 950 administrative staff. The hospital has more than 700 beds and it is now the main teaching hospital in the country (22)

ZMH is a general hospital at the center of Addis Ababa. The hospital is one of the leading hospitals for the treatment of HIV patients with 14000 patients under its care. It has more than 200 beds (23).

The above two hospitals were selected due to their status as higher care centers and treat diverse group of patients from various locations which would allow for generalizability of the study. The study settings were also chosen considering factors such as travel time, cost and infrastructure.

5.1.2 Study Period

The study was conducted from data collected from chart reviews of patients admitted to treatment centers at TASH and ZMH. Treatment centers were opened from August 2023 to November 2023.

5.1.3 Study Design

This study used retrospective chart review. It's a type of observational study where data will be collected from a patient's medical record. Clinical data was obtained from patients admitted to cholera treatment centers in TASH and ZMH Hospital from August to November 2023 using purposive sampling technique.

5.2 Study population

The Study population for this study was patients admitted to treatment centers with the diagnosis of cholera in both hospitals from August to November 2023. Patients with incomplete information were excluded.

5.3 Sample size determination

$N_o = p * (1 - p) * (z\alpha/2)^2 / E^2$

n = sample size

p = estimated proportion of the population with the characteristic

q = 1 - p

zα/2 = critical value from the standard normal distribution for a chosen confidence
E = desired margin of error

n_o= 0.5 x (1-0.5) x (1.96) Λ2/ 0.05 Λ2

n_o= 0.25x 0.9604/ 0.0025

n_o= 384.16 385

$$n = \frac{n_0}{1 + \frac{n_{o/N}}{}} = 385/\ 1+ 385/300= 169$$

5.4. Eligibility Criteria

Inclusion Criteria – patients Admitted to cholera treatment centers during the study period

Exclusion Criteria – patients who left against medical advice

Patients who have incomplete medical records

5.5 Study variables

Dependent variable –severity of dehydration

Independent variable- age, sex, Co morbidities, contact history, duration of illness and address

5.6 Operational definition

a. The standard case definition for suspected cholera cases is any person aged 2 years and above presenting with or dying from acute watery diarrhea.
b. Confirmed cases- is defined as, when *vibro cholera* is isolated from the stool of a suspected case.
c. Treatment center admission - Any patient who went into treatment centers after the patient is suspected to have cholera or is confirmed to have the disease with a stool exam.
d. Treatment center mortality- Any patient who has died in the treatment center.
e. Length of stay- The number of days the patient stayed in the treatment center calculated from the day of admission until the day of discharge or death.
f. Severe dehydration – patients presenting with lethargy, have sunken eyes, are drinking poorly, skin that goes back very slowly on skin pinch.
g. Some dehydration- patients who are irritable, have sunken eyes, are thirsty and have skin that goes back slowly on skin pinch.
h. No dehydration- patients who do not have the above mentioned signs and symptoms.

5.7 Data collection and analysis

Data was collected from patients' electronic data, charts, and laboratory tests from both TASH and ZMH. Information about the patient's demographic status, Co morbidities, hydration status, electrolyte disturbance, and renal function tests was collected from patient charts along with length of stay and outcome. Data was then entered, analyzed using the SPSS version 20. Continuous variables were presented as medians. Categorical variables were expressed as frequencies with percentages were analyzed using Pearson's test. All patients were divided into no, some, and severe dehydration groups. Potential predictive variables such as demography, co-morbidity and clinical signs and symptoms were included. The multivariate logistic models were fitted with severe dehydration used as a reference. Variables which were potentially predictive were investigated using ordinal logistic regression. Ordinal logistic regression is a type of logistic regression used to model a relationship between a dependent variable, which is ordinal and one or more independent variables.

5.8 Ethical consideration

Ethical permission was secured from Addis Ababa University, School of Medicine, Department of Emergency Medicine and Critical Care, as well as TASH and ZMH. Ethical permission was also granted from the Addis Ababa Health Bureau. Information gathered from patients' records was kept confidential.

6. Results

There were a total of 177 patients who were admitted to both treatment centers with a response rate of 79.89%. The medical cards of 143 cholera patients were reviewed. The median age is 39 years (IQR 25-57). There were 66 (46.2%) females and 77 (53.8%) males who were admitted to the treatment centers. A total of 44 patients (30.8%) had co morbid illnesses, and the commonest co morbidities were hypertension (13.2%) and diabetes (9.79%). Out of the 143 patients who were admitted, 11 (7.7%) of the patients had contact history (Table 6.1).

Table 6.1 Socio-demographic characteristics of the study participant

Variable	Category	Frequency (n)	Percent (%)
Sex	Female	66	46.2
	Male	77	53.8
Co-morbidity	Yes	44	30.8
	No	99	69.2
Co- morbid Illnesses	Asthma	7	4.89
	Cardiac	3	2.09
	CKD	4	2.79
	DM	14	9.79
	Hypertension	19	13.2
	Epilepsy	2	1.39
	Malignancy	3	2.09
	RVI	4	2.79
	Old Stroke	1	0.69
	Other	6	4.19
Contact History	Yes	11	7.7
	No	132	92.3
Severity of Dehydration	No Dehydration	30	21.0
	Some Dehydration	59	41.3
	Severe Dehydration	54	37.8

Regarding the severity of dehydration, there were 30 patients (21%) with no dehydration, 59 patients (41.3%) with some dehydration, and 54 patients (37.8%) who had severe dehydration (Table 6.1).

Females were more severely dehydrated (45.5%) when compared to men (31.2%) (Figure 6.1). Out of the 44 patients that had co morbid illnesses, 24 patients (54.5%) had severe dehydration. The majority of the patients (92.3%) did not have a contact history, and 53 patients (39.4%) had severe dehydration.

The most common clinical presentations were diarrhea and vomiting, which occurred in 88.8% of the patients. The mean duration of illness was 2.32 days. Among the admitted patients, 64.3% (92) of the patients had complications. The most common complication is electrolyte disturbance, which occurred in 42.7% (61) of the patients. And AKI occurred in 21% (30) of the patients. The commonest electrolyte disturbances were mild hyponatermia and mild hypokalemia which occurred in 16.8% (24) and 15.4% (22) of the patients respectively.

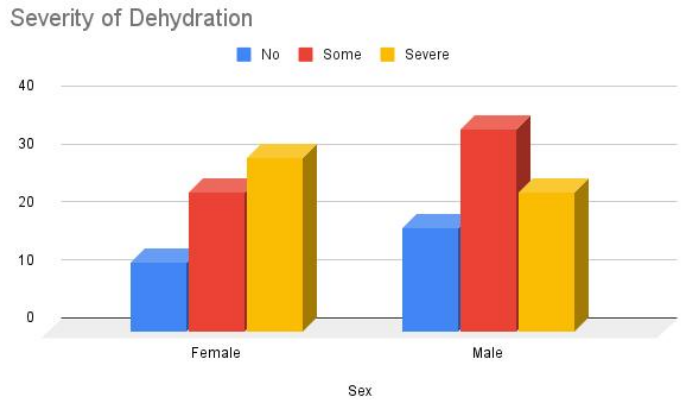
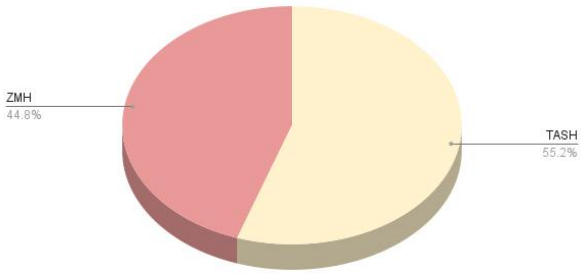


Figure 6.1 Severity level by Sex



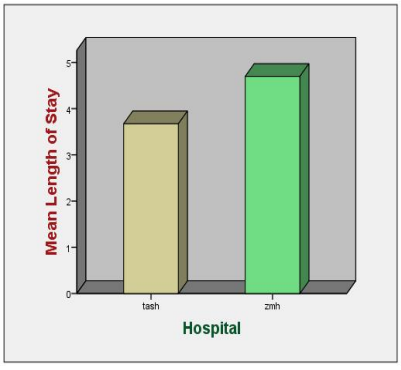


Figure 6.2 and Figure 6.3 Cholera treatment centers and Mean length of stay at the treatment centers.

Out of the 143 patients, 79 (55.2%) patients were treated in the Zewditu Memorial Hospital treatment centers while 64 (44.8 %) patients were treated in Tikur Anbessa Hospital treatment centers (Figure 6.2). The mean length of stay was 4.2 days.

Table 6.2 Factors Associated with Severity Of Dehydration.

Variables	Category	AOR (95%CI)
Sex	Female	2.314 (0.135,1.544)
	Male	1
Co-morbidity	Yes	4.105 (.571, 2.255)
	No	1
Contact History	Yes	0.272 (-2.575, -.023)
	No	1

Patients who are females had 2.314 times [AOR= 2.314 95% CI (0.135-1.544) p=0.02], higher odds of being severely dehydrated compared to male patients. Patients who had co-morbid illness had 4.105 times [AOR= 4.105 95% CI (0.571- 2.255) p=0.001], higher odds of having severe dehydration for when compared with patients who had no co morbid illness. Patients who had contact history were 0.272 times [AOR= 0.272 95% CI (-2.575 - -0.023) p=0.04] less likely to be severely dehydrated when compared with patients who have no contact history. For a one-year increment in age, the severity of dehydration decreases by 0.978 (Table 6.2).

7. Discussion

In our study, which included 143 patients, the majority of the patients had some dehydration. Other studies have reported different results. In their study, Allasar et al reported that 94.8% of the patients had severe dehydration during the 2017 Yemen outbreak (13). In a study done in Oromiya, Ethiopia, Alemayehu et al reported that 58% of the patients had severe dehydration, while 29.2% and 12.7% had some and no dehydration, respectively (20). In this study the median age was 39 years, and most of the patients were males. This is comparable to the case-control study done in Addis Ababa, Ethiopia, and Yemen (9) (13).

Regarding the complications, the commonest complications were electrolyte disturbances, which occurred in 42.7% of the patients. And the commonest were mild hypokalaemia and moderate hyponatermia. In a study done in Kenya, the commonest electrolyte disturbances were hypokalemia and hyponatermia which occurred in 26.8% and 40.2% of the patients respectively, (21). In our study 21% of the patients had AKI. This is in contrast to other studies. In a study done in Benglauru, the incidence of AKI was 78%. In another study done in Nigeria, the diagnosis of AKI was made in 60.6% of the study participants (19). In our study the mean length of stay was 4.2 days; this is in contrast to a study done in Sierra Leone where majority of the patients stayed for only 2 days (14).

Our study findings suggest that there is a potential relationship between female sex and severity of dehydration [AOR: 2.134]. But it is not statistically significant [95% CI (0.135-1.544)]. The increased association between females and increased severity of dehydration may be due to many factors, including hormonal changes, having a lower percentage of body water content, and fluid intake. Other studies have reported different results. In their study, Alemayehu et al, found that there was no relation between sex and the severity of dehydration (20).

Our findings suggest that there is a potential association between patients who have co-morbidities and the severity of dehydration [AOR: 4.105 95% CI (0.571-2.255)] when compared to patients who do not have any co-morbidity. But it is not statistically significant. The increased association may be due to several factors. One factor can be the presence of impaired organ function from the patient's baseline. Other reasons might be medication side effects, increased fluid loss, and an altered level of thirst sensation.

According to our results, patients who had a contact history were less likely to be severely dehydrated than patients who did not have a contact history. This is in contrast to other studies that have found opposite results. In a study done in Oromiya, Ethiopia, it was reported that patients who had a contact history and travel history were more likely to be severely dehydrated (20). Patients with a history of contact were less dehydrated, and this may be due to early health-seeking behavior because these patients were already aware of the signs and symptoms of cholera.

Younger patients were found to have severe dehydration when compared to older patients. Other studies have found similar results. For instance, patients who are younger than the age of 15 are more likely to experience severe forms of cholera. In the study done in Nepal, younger patients under the age of 30 years were most affected during the 2004 outbreak. In Nigeria, younger patients below the age of 15 were disproportionally affected (13).

8. Conclusion

The aim of this study was to identify the severity of dehydration and associated factors among patients who were admitted to cholera treatment centers. The factors that had increased association with the severity of dehydration were age, sex, co-morbidity and contact history, but the results are not statistically significant, and further research with a lager sample sizes is needed to confirm these findings.

9. Limitation of the Study

- ✓ Small sample size- The statistical power of the study may be lowered due to small sample size which could potentially affect significant variations or correlations in between variables. Due to smaller sample size, there might be a limitation in the diversity of the participant which could affect the generalizibility of the study.
- ✓ Retrospective chart review- another limitation for this study is that it is a retrospective chart review. One limitation is that it's prone to selection bias, as not all essential information may be included in medical records. Furthermore, the quality and completeness of medical records might vary and potentially result in missing information.

10. Recommendation

- ✓ Recognize early signs of severe dehydration- by recognizing the signs health care professionals can promptly treat dehydration and prevent complications.
- ✓ Develop enhanced patient care- by closely following patient's vital signs, identifying early signs of shock, and monitoring fluid balance health care providers can effectively manage cholera patients.

- ✓ Implement targeted therapies- by providing rehydration therapy which is the cornerstone of therapy for cholera, health care professionals can prevent severe dehydration and reduce morbidity and mortality.

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10. Annex

1. Demographic information	a. Age
	b. Address
	c. Travel History Yes ☐ NO ☐ If Yes Specify _____
	d. Contact History Yes ☐ No ☐ If yes specify ____
2. Length of stay	a. Date of Admission ___/____/___ b. Date of discharge ___/____/____ c. Length of Stay ____
3. Clinical Information	a. Co morbidity Yes ☐ No ☐ b. If yes Specify 1. DM 2. Hypertension 3. Epilepsy 4. Asthma 5. Copd 6. Cardiac illness 7. CKD 8. RVI 9. Other-
	c. Duration Of Illness ____
	d. Clinical Signs and symptoms Diarrhea ☐ Vomiting ☐ Nausea ☐ Abdominal cramp ☐ Fever ☐ Headache ☐ Myalgia ☐ Other____

	e. Level of Dehydration No Dehydration ☐ Mild Dehydration ☐ Severe Dehydration ☐
4. Laboratory Result	a. Electrolyte Level 1. At admission Na+___ K +____ Cl -___ Ca+____
	b. Renal Function Test 1. At Admission Creatinine___ BUN____
	Discharged ☐ Died ☐ Transferred to another hospital ☐ Reason for transfer for other hospital ____
5. Outcome	

Annex- Adapted from WHO Cholera surveillance Toolbox