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Research Article

CHOLERA OUTBREAK BURDEN IN BLUE NILE STATE, SUDAN, 2018

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ABSTRACT

Background: Cholera is an age-old disease caused by infection with a bacteria acquired through the fecal-oral route. It results in acute watery diarrhoea and copious vomiting which kills within few hours if the patient is not rehydrated in time, either orally or in extreme cases, through intravenous rehydration. **Objectives:** This study aimed to measure the burden of cholera and cholera-related mortality in Blue Nile State, 2018. **Materials and methods:** A descriptive epidemiological study was carried out in Blue Nile State during cholera outbreak 2018. Data was collected from patients' records during period of outbreak from August to November 2018. **Results:** A total of 21 cases were reported during 2018 with zero death. Most of cholera cases in the year 2018 was recorded in Eldamazin locality 16 (76.2%) followed by Elroseries locality 2 (9.5%). female was more affected by cholera 14 (66.7%) compared to male 7 (33.3%). Figure 3 illustrates that the most age group affected by cholera was the age ranged between 41-60 years 8 (38.1%) followed by the age group 21-40 years 6 (28.6%). **Conclusion:** The study concludes that the number of cases during 2018 is very low with no deaths and the containment of the outbreak is done in short time, this may be due to accumulative experiences of the state in Cholera control and the effectiveness of the WASH intervention and effective case management.

Keywords: Cholera, Burden, Blue Nile state, Sudan, 2018.

INTRODUCTION

Cholera is an acute watery diarrhea syndrome caused by Vibrio cholerae. Descriptions of clinical illnesses consistent with cholera date back to antiquity.(1) During the 19th and 20th centuries, the disease spread across Asia and worldwide seven times in what were called cholera pandemics. The first pandemic began in 1817, subsequent pandemics in 1829, 1852, 1863, 1881, 1889, and 1961, and the last pandemic continues to the present. Global Epidemic Patterns.

Although most of Asia, Africa, Europe, and the Americas have been affected at one time or another, global patterns of transmission vary (1). V. cholerae, which contains members of the O1 and O139 serogroups that cause cholera, is found in aquatic environments, particularly in brackish rivers, estuaries, and coastal areas (2). It is important to distinguish between globally endemic pandemic V. cholerae clones and local V. cholerae populations. Some strains circulating locally cause syndromic cholera, but not pandemic cholera (3). Cholera is transmitted by the fecal-oral route, either directly from person to person or indirectly via contaminated body fluids from environmental reservoirs over various time periods, food, and through flies and ticks (4). Endemic cholera has been found to be associated with tidal saltwater intrusion and seasonal climate patterns. Endemic cholera, on the other hand, often occurs near waterways when weather conditions are favorable for bacterial growth (5), and an interaction between the water environment and the spread of cholera by fecal-oral transmission has long been believed (6).

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However, recent genome sequencing of clinical isolates indicates that only a subset of specific V. cholerae clones are responsible for the current epidemic, that they circulate in the population, and that they are largely unrelated to the diverse V. cholerae spectrum.

They are largely unrelated to the diversity of V. cholerae strains (7). Cholera-infected individuals excrete V. cholerae in their stools. The excretion period may be as short as one day in asymptomatic contacts of infected persons, but stools from symptomatic patients may contain the organism for one to two weeks before illness onset (8). More prolonged shedding of the organism has also been reported (9). The median time from infection to disease onset (incubation period) is 1.4 days, with 5% of cholera patients developing symptoms by 12 hours after infection and 95% by 4.4 days (10). Cholera bacteria in stools are a mixture of swimming cholera cells and biofilm-like aggregates (11). V. cholerae alternates between these swimming and biofilm forms in order to efficiently colonize the small intestine; V. cholerae biofilms are more resistant to host stress conditions, have a lower infectious dose, and may facilitate disease transmission (12). Rapid transmission of cholera by the fecal-oral route may also be facilitated by the transient hyper infectious state of V. cholerae present in fresh stool (12). Stool borne V. cholerae may influence transmission, especially in densely populated areas, because the stool borne V. cholerae remains in a hyper infectious state for several hours after transmission (8). Cholera cases tend to cluster, which may be due to direct person-to-person transmission, common sources of infection, or transmission from local environments contaminated by cases (13). Direct transmission of cholera in the home is a major contributor to cholera transmission (14). People living in close proximity to cholera patients are at high risk of developing cholera. In a study in Bangladesh, more than 70% of

rectal swab-positive contacts reported diarrhea during a 21-day observation period after the onset of the index patient (9), and about one-quarter of 294 household contacts of cholera patients were infected with V. cholerae and shed the bacteria (15). In addition to interpersonal contact causing the accumulation of secondary cases, a close association of risk factors within the population (lack of access to safe water, poor sanitation, and unsanitary food handling behaviors) may also explain the accumulation of cholera cases (16). Given the clonal nature of cholera, which is spread by human-to-human transmission (7), improving sanitation is important for cholera control. The purpose of this study is to investigate the cholera burden in Blue Nile State in 2018.

MATERIALS AND METHODS

Study design:

A descriptive epidemiological study was carried out. Cholera-related mortality in the year 2018 was analyzed according to location, age, and sex.

Study area:

Blue Nile State lied in southern part of the country bordering from southeast Ethiopia, southwest of South Sudan and north is Sinner state. With an area of 38,000 km square and 1,250.00 populations. Blue Nile River is crossing the state from south to north fed by numbers of streams and tributes. This gives unique feature for agricultural and live stocks herding activities. Rainy season starts early in June and ends in late October. Elroseres High Dam famous hydro-electric project that supplies country with electricity and irrigation water sources, particularly Aljazeera agriculture scheme and it is rich of mechanized agriculture in Al Tadamon locality. BNS is served by number of (160) health facilities (HFs). The population at Blue Nile State depends on different water sources. Water from network, which covers approximately (25%) of the population; The other sources are out network e.g., Hand pumps, water yards, dug wells (open/closed), river, seasonal streams, open sources (shallow wells, hafeers).

Study population:

Blue Nile State Community.

Inclusion criteria:

All patients during the outbreak attending to health facilities with acute watery diarrhea.

Exclusion criteria:

Patients with diarrhea not diagnosed as cholera case.

Sample size and sampling technique:

All cholera cases during outbreak period.

Data collection:

Data will be collected from all health facilities according to outbreak records.

Data analysis:

Data was analyzed using SPSS version 24.0. Descriptive statistics was used. Chi-square test was used to find an association between variables. P-value considered significant at less than 0.05 levels.

RESULTS

Table 1 shows that most of cholera cases in the year 2018 was recorded in Eldamazin locality 16 (76.2%) followed by Elroseries locality 2 (9.5%); Geisan locality 2 (9.5%), Wadalmahi locality 1(4.8%). Figure 1 shows that the cholera cases was started in May (2018) 3 (14.3%) and increased in June (2018) 18 (85.7%). Figure 2 show that female was more affected by cholera 14 (66.7%) compared to male 7 (33.3%). Figure 3 illustrates that the most age group affected by cholera was the age ranged between 41-60 years 8 (38.1%) followed by the age group 21-40 years 6 (28.6%), age group more than 60 years 4(19%) while the lowest age group was the age group age group ranged between 1-20 years 3 (14.3%). The mean age of cholera patients was (46.2±19.8) years with maximum age of 80 years and minimum age of 11 years.

Table 2 indicates that the proportion of deaths was 0.0% with case fatality rate of 0.0.

Table 1. Distribution of cholera cases by localities in Blue Nile State, 2018

Locality	No.	%
Elroseris	2	9.5
Eldamazin	16	76.2
Baw	0	0.0
Wad Almahi	1	4.8
Elkurmuk	0	0.0
Geisan	2	9.5
Eltadamon	0	0.0
Out of state	0	0.0
Total	**21**	**100.0**

n=21

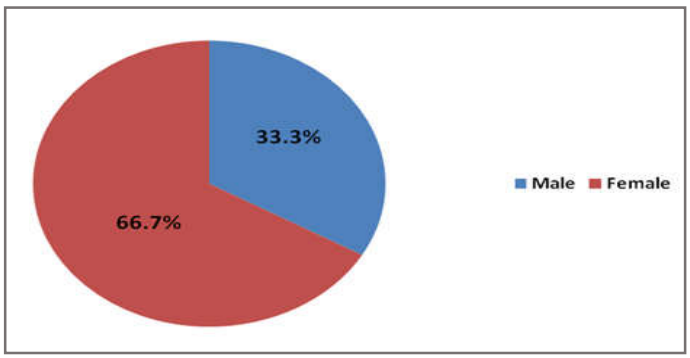

Fig.2. Distribution of cholera cases according to gender in Blue Nile State 2018 (n=21)

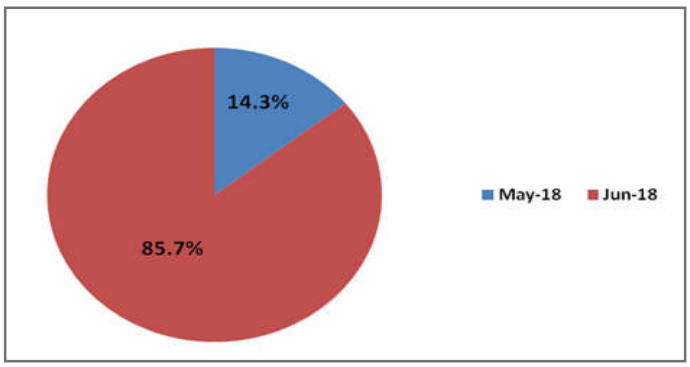

Fig.1. Distribution of cholera cases according to months in Blue Nile State 2018 (n=21)

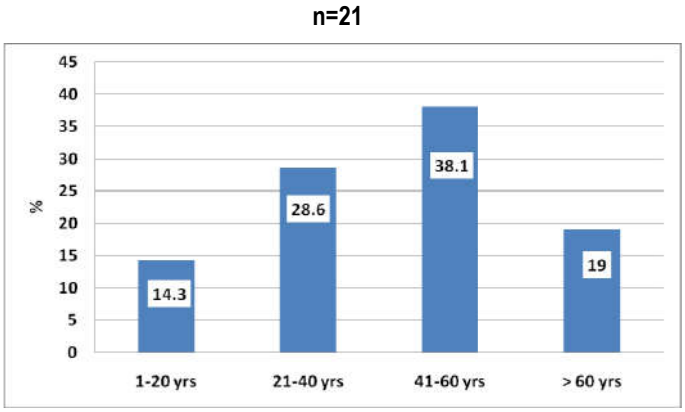

Fig.3. Distribution of cholera cases according to age group in Blue Nile State 2018(n=21)

Mean age: mean± SD= 46.2±19.8; Maximum age = 11 yrs; Minimum age= 80 yrs.

Table 2. Proportion of cholera death in Blue Nile State 2017

Condition	No.	%	Case Fatality rate (CFR)
Alive	21	100.0	
Dead	0	0.0	0.0
Total	**21**	**100.0**	

DISCUSSION

The present study aimed to measure the burden of cholera during outbreak in the year 2019 and deaths among cases. The study showed that a total of 21cases was reported during the outbreak with no reported death. The most of cholera cases in the year 2018 was recorded in Eldamazin locality 16 (76.2%) followed by Elroseries locality 2 (9.5%). The containment of the outbreak is done early this maybe due to accumulative experiences of medical and health cadres in Blue Nile State during previous outbreaks in the years 2016 and 2017. Comparable studies from Africa in 2019, 16 African countries reported 55 087 cholera cases, with a CFR of 1.6%, lower than the 2.0% reported for the region in 2018. While the CFR from the African region has decreased, the opposite has been observed in specific country hotspots, such as a 0.4% increase in Cameroon, 1.2% in Liberia, 2.2% in Benin and 3.5% in Nigeria. (17)

Moreover the study indicated that female was more affected by cholera 14 (66.7%) compared to male 7 (33.3%). The most age group affected by cholera was the age ranged between 41-60 years 8 (38.1%) followed by the age group 21-40 years 6 (28.6%) .

Recently, attempts have been made to look for answers concerning sexual dimorphic differences in morbidity and mortality from cholera in biological reasons. Watanabe and a team (18) have reported that female mice are more sensitive to cholera toxin than male ones. According to the authors, the level of some proteins (ARH1 protein) may affect the gender specificity in the response to cholera toxins. Similar and dissimilar findings to our studies showed that .i.e. the WHO report (19) points to traditional social roles as a factor responsible for the surplus of deceased women and girls over men and boys. The higher incidences of cholera among women result from their potentially frequent contact with contaminated water when preparing and cooking meals, feeding, caring for and washing children, and caring for sick family members. A link between the increased morbidity and deaths from cholera and traditional division of roles, assigning women to run the household and to care for the sick, are confirmed by studies of cholera epidemics in northern Jakarta (20) and in James Town, a community from the sub-Metropolitan area in Accra, Ghana (21). A greater risk for symptomatic cholera in females than males was also confirmed by studies of cholera epidemics in Bangladesh (22), in nomadic pastoralist groups from the sub-Saharan parts of Uganda (23), and in Columbia (24). Female cholera cases outnumbered male cases in Mpumalanga Province, South Africa (25), which also had their socio-cultural justification. Men migrated from the Province in search for work and education more often than women, hence women predominated the Province population (26). The example of cholera epidemic in Sierra Leone in 2012 also attributes the high morbidity and mortality rates among women to their roles in traditional society, i.e. running of the household and the care for children and the sick.

CONCLUSION

The study concludes that the number of cases during 2018 is very low with no deaths and the containment of the outbreak is done in short time, this may be due to accumulative experiences of the state in Cholera control and the effectiveness of the WASH intervention and effective case management.

DECLARATION OF COMPETING INTEREST:

The authors declared that there is no conflict of interest.

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