ISSN: 2091-2749 (Print)
2091-2757 (Online)

Demographic profile of patient with acute watery diarrhea during monsoon 2022: Patan Hospital, Nepal

Sneha Joshi[1], Shreya Baniya[1], Ashis Shrestha[2], Sumana Bajracharya[2], Piyush Rajbhandari[3], Sushmita Joshi[1]

[1]Intern, [2]Asst. Prof. Dept. of General Practice & Emergency Medicine, [3]Asst. Prof. Dept. of Microbiology, Patan Hospital, Patan Academy of Health Sciences, Kathmandu, Nepal

Correspondence
Dr. Shreya Baniya
Patan Hospital,
Patan Academy of Health Sciences, Lalitpur, Nepal
Email:
shreyabaniya@pahs.edu.np

Abstract

Introduction: Diarrhea is the passage of three or more loose or liquid stools per day or more. Acute watery diarrhea is a major public health problem worldwide. In Nepal, diarrhea is among the top 10 inpatient morbidity. This study's objective is to monitor demographic characteristics and laboratory findings of stool specimens of diarrhea.

Method: This is a cross-sectional descriptive study done at Patan Hospital. Ethical approval was taken from the Ethical committee. Data for Monsoon 2022 (June to September 2022) were collected from the Patan Hospital record system. Cases from within the Lalitpur district were included.

Result: Out of 119 cases, 50(42%) were male and 69(58%) were female. The mean age±SD was 33.28±25.38 (p=0.083) with maximum cases observed during June and a peak observed during the fourth week of June. Out of 119, 4(3.3%) were stool culture positive. Two cases of *Vibrio cholera,* one case of *Shigella sonnei,* and one case of *Salmonella parathypi B* were isolated. In the etiological profile, 14 *Entamoeba histolytica* were isolated.

Conclusion: During the outbreak of diarrhea in Monsoon 2022, adults were affected most. The culture of acute watery diarrhea showed two cases of *Vibrio cholera.*

Keywords: cholera, diarrheal disease, monsoon

Submitted
10 Apr 2023

Accepted
11 May 2023

How to cite this article
Joshi S, Baniya S, Shrestha A, Bajracharya S, Rajbhandari P, Joshi S. Demographic profile of patient with acute watery diarrhea during monsoon 2022: Patan Hospital, Nepal. Journal of Patan Academy of Health Sciences. 2023Aug;10(2):65-71.

https://doi.org/10.3126/jpahs.v10i2.59283

Introduction

World Health Organization (WHO) defines Diarrhea as the passage of three or more loose or liquid stools per day or more frequent passage than it is normal for the individual.[1] Globally, diarrheal diseases are one of the foremost causes of death.[2,3] Diarrheal illness accounts for 2.5 million deaths per year globally.[4] Most cases are associated with contaminated food and water sources.[5] In developing countries, infectious causes of acute diarrhea are associated with contaminated food and poor water supply sanitation.[6] In these countries, children under three years old experience on average three episodes of diarrhea every year.[1]

In Nepal, Diarrhea is among the top 10 inpatient morbidity and has an incidence of 350 per 1,000 under five years of children (2019/2020).[6] A study done in children hospitals in Nepal showed the highest infection was due to intestinal parasites followed by rotavirus and then pathogenic bacteria. Among the bacteria isolated, the predominant bacteria were *Shigella species* followed by *Vibrio species* and then *Escherichia coli* and *Salmonella species.*[7] Another study done among patients with acute watery stool found the incidence of cholera to be 27.1% with the 15-30 years' age group being more susceptible to cholera. The period from mid-June to mid-July had a peak incidence of it.[8] There has been an increased incidence of acute watery diarrhea along with the detection of cholera.[9] This study was designed to find out the demographic profile of diarrheal illness including the reports of etiological profile and bacteriological culture during Monsoon 2022 at Patan Hospital.

Method

This is a descriptive study done at Patan Hospital, Patan Academy of Health Science (PAHS), Lalitpur, Nepal. The study was approved by the Intuitional Review Committee of PAHS, Ref No: drs2208021663. The main objective of this study was to explore the demographic and time variation of the patient with acute watery diarrhea in the patient presenting to Patan Hospital.

We included all participants with acute watery diarrhea; however, we excluded data with incomplete reports (address not clear, stool culture not available) and cases whose registration address was outside of Lalitpur District. We used the hospital's record system data of acute watery diarrhea from the Monsoon (June to end of September) year 2022. The records from the record section were preferred to include all the patients with diarrheal illness presentation to our center in various departments. These data are reliable and includes patient's name, age, sex, address, and hospital number. The data that were used in our study were anonymized and stored using codes. The demographic details collected from the record section included hospital numbers, which were later entered individually to the hospital monitoring system. This system includes all the investigation records under the hospital number. Various reports of stool profile including culture were collected. Patan hospital gives a report of *E. histolytica* and *Giardia* in etiological profile and *Salmonella*, *E. Coli*, and *Cholera* in bacteriological culture. Data were collected using google forms which were analyzed using excel sheet and SPSS software.

Result

Out of 250 cases of acute watery diarrhea presenting to PAHS during monsoon 2022, 127 cases were that of Lalitpur district. Out of 127, eight cases were excluded as they had missing demographic data including their stool RME and culture reports. A total of 119 met the inclusion criteria and were analyzed, Table 1. The mean age±SD was 33.28±25.38 y ($p=0.083$, following Kolmogorov-Smirnov test, since p is >0.05, test follows normal distribution). Out of 119, 50(42%) were male and 69(58%) were female.

Out of 119, 4(3.3%) were stool culture positive, 2(1.6%) cases of *Vibrio cholerae* were

isolated, 1(0.84%) case of *Shigella sonnei* and 1(0.84%) case of *Salmonella parathypi B.* In the etiological profile, 14(11.76%) of *Entamoeba histolytica* and no cases of *Giardia* were isolated.

The number of acute watery diarrhea cases was highest during June i.e., 51 cases, followed by July with 38, and declined during August with 18 cases and only 12 cases during September, Figure 1.

The second and third weeks of June showed a steady rise in diarrheal cases with the peak during the third and fourth weeks. However, from the first week of July, the trend of the cases slowly decreased and reached up to six cases in the third week of July and lastly zero cases in the fourth week of September. The maximum number of cases (30) was recorded in the fourth week of June, Figure 2. There was a peak in both male and female cases during the third and fourth week of June with a steady decrease in cases, however, there was a slight rise in female cases during the first week of August. The maximum number of male cases was 13 and female cases was 17 which was recorded in the fourth week of June, Figure 2.

The mean age affected during the first week of June was one. There was a steady rise in the mean age group. The highest mean age±SD (49.5±6.3) was encountered on fourth week of September, Figure 3.

Table 1. Baseline characteristics of the total patients presenting with acute watery diarrhea during monsoon 2022 at Patan Hospital, N=119

Characteristics	***f (%)***
Male	50(42%)
Female	69(58%)
Average age	33.28±25.38 (mean±SD)
Culture positive	4(3.3%)
1. Cholera	2(1.6%)
2. Shigella	1(0.84%)
3. Salmonella	1(0.84%)
4. E coli	0(0%)
5. No isolates	103(86.55%)
Etiological profile	14(11.76%)
1. E Histolytica	14(11.76%)
2. Giardiasis	0(0%)
3. No isolates	105(88.23%)
Total number of cases	**119**

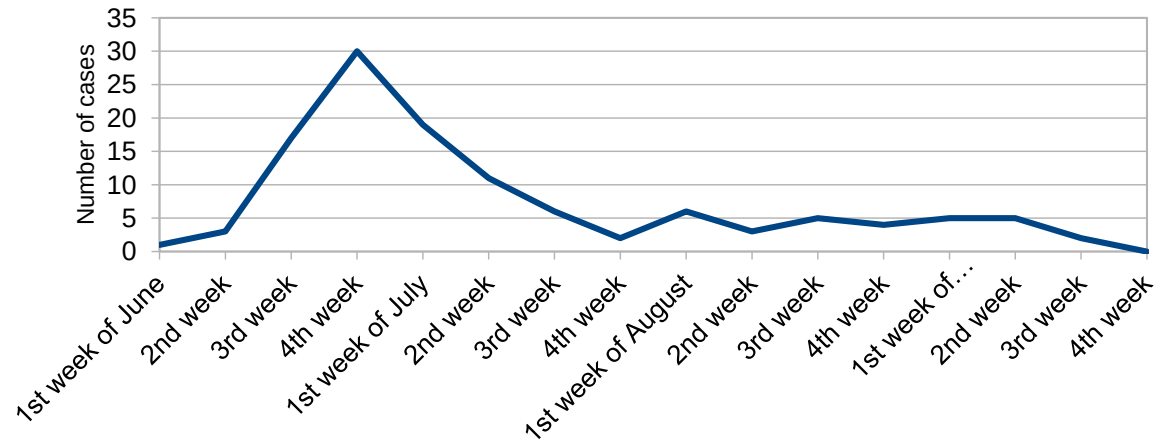

Figure 1. Number of monthly cases during monsoon 2022 at Patan Hospital

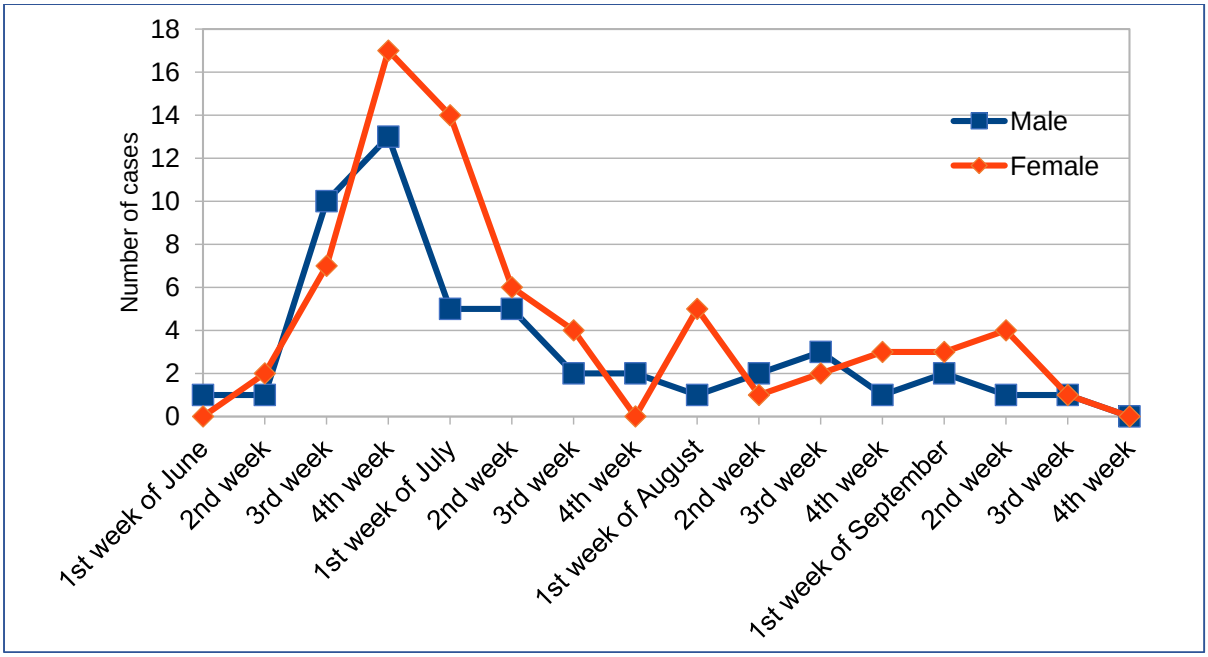

Figure 2. Weekly trend of diarrheal cases during monsoon 2022 at Patan Hospital

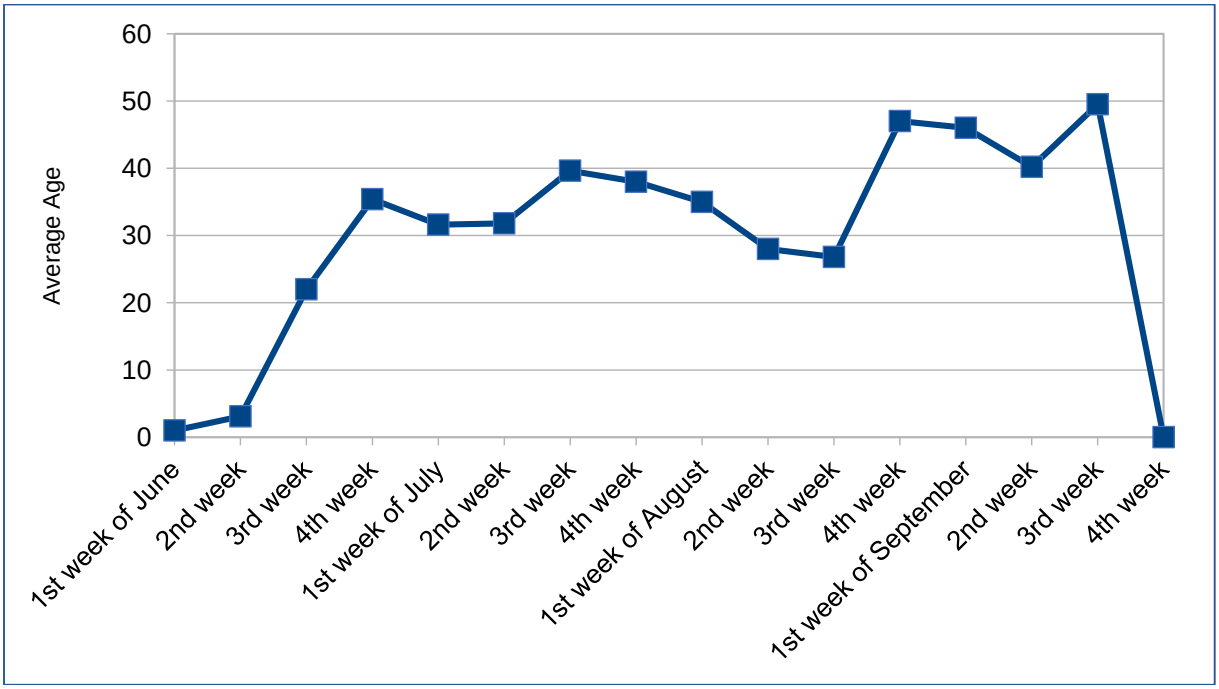

Figure 3. Weekly average age of patient with acute watery diarrhea during monsoon 2022 at Patan Hospital

Discussion

Out of 119 individuals, the mean age±SD was 33.28±25.38 years presented to our center with the complaint of diarrheal illness. The second and third week of June showed steady rise in the number of cases, making June the month with maximum number of cases, i.e., 51, following which the number of cases declined. The cases of male and female both increased throughout with peak in both male and female cases during the third and fourth week of June, which slowly decreased. Despite the decline in the cases, there was a slight rise in female cases during the first week of August. The average age affected

during the first week of June was one and during the third week of September, the average age was found to be 49.5 years. Out of four culture positive cases, two cases isolated *Cholera*, and one cases of each *Salmonella* and *Shigella* was isolated. Among 119 cases, 14 cases showed *E. Histolytica.*

Every year in Nepal, there is a cyclical variation in diarrheal cases with a peak during early monsoon.[11] Similar findings were also seen in a study done in Thailand, which concluded that during early monsoon, households changed their water source from groundwater to rainwater and the rising humidity fostered the growth of enteropathogens.[12] Likewise, in Gambia, people use surface wells mostly and it was found that, although this water was fecally contaminated throughout the year, levels of contamination exaggerated by up to 100 times within one to two days of the start of the monsoon because excreta is washed into the wells and similar finding was also found in Ecuador where significantly higher *Escherichia coli* counts in surface and stored water was found during the rainy season compared with the dry season.[13,14] Nepal faces flooding and landslides during the monsoon season every year. Kathmandu valley has massive and unplanned urbanization with improper drainages leading to the breakdown of the fragile water and sanitation infrastructure and a rise in waterborne diseases.[11] This could be one of the possible causes for the rise in acute watery diarrhea during starting of monsoon.

In the past, cholera has remained endemic with various big epidemics in Nepal. The largest cholera outbreak occurred in 2009 in Jajarkot and its neighboring districts.[16] In 2016, 150 cases of cholera were reported in Kathmandu Valley. However, the number of cholera cases in Kathmandu Valley was significantly reduced in 2017, and in 2018 there were only two reported cases which were after the implementation of Nepal's first National Cholera Control Strategy.[17] The program had focused on educating communities, government officials, hospital staff, and local NGOs in Kathmandu Valley regarding cholera and AGE, water chlorination, safe water drinking, and hand wash practice along with increased monitoring of drinking water quality.[18] This finding was also congruent with our study where cholera was less isolated (1.8%). In our study, we found that females are affected predominantly throughout the monsoon season, such findings were also seen in India, where the outbreak had female predominance of 60%.[15]

Approximately around 11-21 million cases of Salmonella occur worldwide each year with 200,000 deaths.[19] Similarly the incidence of Shigella is reported to be about 188 million cases per year with approximately one million deaths each year.[20] Likewise, in Bhutan, Salmonella species accounted for 42.9% of food-borne diarrhea and Shigella species (21.4%).[21] In our study, the incidence of both Salmonella and Shigella is 0.84%.

With extreme rain during the monsoon, the cases of diarrhea increased particularly for bacterial and parasitic diseases.[22] After the first two cases of cholera were isolated in Nepal on 16th June 2022, an emergency meeting on preparation and response to Cholera was held by the Ministry of Health and Population. Following this, Kathmandu Upatyaka Khanepani Limited (KUKL) conducted continuous and high chlorine dosing and free residual chlorine testing and focused on alternate water sources. Water testing and Water treatments were encouraged along with community awareness which ultimately led to a decrease in the trend of diarrhea from the fourth week of June.[23]

According to US Environmental Protection Agency, the elderly along with children and pregnant women were recognized as a sensitive sub-population for water-borne diseases.[24] In our study, the average age of diarrhea at the end of September is comparatively higher (approx. 50) than the previous week, which could be due to the underlying co-morbidities leading to a poor immune system. A study done in India

showed the prevalence of the water-borne disease among the elderly in rural areas was higher than in urban areas. Among the elderly, malnutrition due to poor feeding, decreased absorption, unimproved water sources, poor hygiene, presence of multiple underlying medical conditions, low immune system, and frequent use of drugs were associated with the cause.[24] There are some limitations to this study. The investigations are limited to bacteria and parasites in the samples, but did not investigate the burden of enteric viruses in diarrheal diseases, which are also a major cause of acute watery diarrhea worldwide.

Conclusion

Adults and females were more affected with acute watery diarrhea. The maximum number of cases were seen during July with cases declining in the following months. E. Histolytica was the commonest isolate.

Acknowledgement
None

Conflict of Interest
None

Funding
None

Author Contribution
Concept, design, planning: SJ, SB, AS, SUB, PR, SUJ; Literature review: SJ, SB, SUJ; Data collection: SJ, SB; Data analysis: SJ, SB, AS, SUB, PR, SUJ; Draft manuscript: SJ, SB; Revision of draft: SJ, SB, AS, SUB, PR, SUJ; Final manuscript: SJ, SB, AS, SUB, PR, SUJ; Accountability of the work: SJ, SB, AS, SUB, PR, SUJ.

Reference

1. World Health Organization. Health topics/Diarrhea. | Weblink |
2. GBD 2016 Diarrhoeal Disease Collaborators. Estimates of global, regional, and nationality morbidity, mortality, and aetiologies of diarrhoea in 195 countries: a systemic analysis for the Global Burden of Disease Study 2016. Lancet Infect Dis. 2018 Nov;18(11):1211-1228. | DOI | PubMed | Google Scholar | Weblink |
3. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020 Oct 17;396(10258):1204-22. | DOI | PubMed | Google Scholar | Weblink |
4. Kosek M, Bern C, Guerrant RL. The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. Bull World Health Organ.2003;81(3):197-204. | PubMed | Google Scholar | Weblink |
5. World Health Organization. Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines. | Weblink |
6. DuPont HL. Diarrheal diseases in the developing world. Infect Dis Clin North Am. 1995 Jun;9(2):313-24. | DOI | PubMed | Google Scholar | Weblink |
7. Sherchand JB, Yokoo M, Sherchand O, Pant AR, Nakogomi O. Burden of Enteropathogens Associated Diarrheal Diseases in Children Hospital, Nepal. Sci World. 2010 Oct. 13;7(7):71-5. | DOI | Google Scholar| Weblink|
8. DoHS: Annual Report 2076/77 (2018/19). In.: Ministry of Health and Population (MoHP), Department of Health service (DoHS) 2020. | Weblink |
9. Karki R, Bhatta DR, Malla S, Dumre SP. Cholera incidence among patients with diarrhea visiting National Public Health Laboratory, Nepal. Jpn J Infect Dis. 2010 May;63(3):185-7. | PubMed | Google Scholar | Weblink |
10. Lalitpur Metropolitan City, Government of Nepal. Ward Profile | Weblink |
11. Rai SK. Changing trend of infectious diseases in Nepal. Adv Exp Med Biol [Internet]. 2018;1052:19–38. | Google Scholar |Weblink |
12. Pinfold JV, Horan NJ, Mara DD. Seasonal effects on the reported incidence of acute diarrhoeal disease in northeast Thailand. Int J Epidemiol. 1991 Sep;20(3):777-86. | DOI | PubMed | Google Scholar | Weblink |
13. Rowland MG. The Gambia and Bangladesh: the seasons and diarrhoea. Dialogue Diarrhoea. 1986 Sep;(26):3. | PubMed | Google Scholar | Weblink |
14. Bhavnani D, Goldstick JE, Cevallos W, Trueba G, Eisenberg JN. Impact of rainfall on diarrheal disease risk associated with unimproved water and sanitation. Am J Trop Med Hyg. 2014 Apr;90(4):705-11. | DOI | PubMed | Google scholar | Full Text |

15. Maramraj, K.K., Subbalakshmi, G., Ali, M.S.et al.A community-wide acute diarrheal disease outbreak associated with drinking contaminated water from shallow bore-wells in a tribal village, India, 2017.BMC Public Health20, 231 (2020). | DOI | Google Scholar | Full text |
16. Bhandari G, Dixit S, Ghimire U, Maskey M. Outbreak Investigation of Diarrheal Diseases in Jajarkot. J Nepal Health Res Council [Internet]. 2010 Apr. | Google Scholar | Weblink|
17. UNICEF. Field notes on WASH: Evolution of the Kathmandu Valley Cholera Prevention and Preparedness Programme | Weblink |
18. OCHA 2023, Nepal: Acute Watery Diarrhea, Final report. | Weblink |
19. CDC. Typhoid Fever and Paratyphoid fever for healthcare professionals. | Weblink |
20. Aslam A, Okafor CN. Shigella. StatPearls. 2022. | Weblink |
21. Chhetri V, Pokhrel HP, Dorji T. A review on foodborne disease outbreaks in Bhutan. WHO South East Asia J public health. 2021;10(2):101-104 | DOI | PubMed | Google Scholar | Weblink |
22. Kraay ANM, Man o, Levy MC, Levy K, Lonides E, Eisenberg JNS. Understanding the impact of rainfall on diarrhea: Testing the concentration-dilution hypothesis using a systematic review and meta-analysis. Environ health prespect. 2020; 128(12):126001 |DOI | Google Scholar | Full Text | Weblink |
23. Situation update on acute watery diarrhea outbreak in Kathmandu valley 2022. GON. | Weblink |