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Gastrointestinal Norovirus Infections at the Mohammed V Military Teaching Hospital, Morocco

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Abstract

Background:
Viral gastroenteritis is a major cause of morbidity and mortality. In Morocco, epidemiological data on Norovirus remain scarce. This study aims to assess the prevalence of Norovirus and identify potential risk factors associated with infection.

Patients and Methods:
From February 1 to June 13, 2024, 94 stool samples were tested for Norovirus using real-time RT-PCR. Epidemiological and clinical data were collected via a structured information sheet.

Results:
The overall Norovirus infection rate was 8.5%. Most cases were among individuals aged 25-40 years, with a male-to-female ratio of 1.67. Predominant symptoms included diarrhea (100%), abdominal pain (100%), nausea (75%), fever (62%), vomiting (61.5%), and dehydration (37.5%). Key risk factors included consuming non-homemade meals (75%) and poor hygiene, such as irregular hand washing (25%).

Conclusion:
This study highlights that Norovirus is a common cause of acute gastroenteritis in Morocco, highlighting the need to include other enteric viruses in the surveillance system.

Keywords: Norovirus, Gastroenteritis, Morocco, Risk factor
PALABRAS CLAVE: Norovirus, Gastroenteritis, Marruecos, Factor de riesgo

Introduction

Noroviruses cause acute gastroenteritis in humans. They belong to the *Caliciviridae* family and are classified into 5 genogroups with numerous genotypes. Noroviruses are small, non-enveloped, single-stranded RNA viruses with positive polarity (1). Norovirus are more frequent in winter due to their ability to thrive in cooler temperatures. These highly contagious viruses are stable in the environment and are easily transmitted *via* water, food, or directly from person to person in a feco-oral mode. The incubation period after infection ranges from 10 to 51 hours, leading to symptoms such as stomach cramps, diarrhea, and vomiting (2). Typically, outbreaks occur in small communities and last around 2 to 3 days (3). The aims of our study are to analyze the prevalence of Norovirus and to investigate potential risk factors associated with Norovirus infection.

Patients And Methods

This study is a descriptive and analytical cross-sectional investigation aimed at determining the

prevalence of Norovirus gastrointestinal infections over a five-month period from February 1, 2024, to June 13, 2024. A total of 94 stool samples were collected from patients with gastroenteritis symptoms (stomach cramps, diarrhea and vomiting), from both hospitalized and outpatient. Stool samples were collected in sterile, labeled 150 ml containers. Samples were initially stored at 4°C for 24 hours and subsequently at -80°C for longer-term storage. Each stool sample was homogenized by vortex for 1-2 minutes and then centrifuged at 4000 rpm for 10 minutes to clarify the suspension. RNA extraction was performed using the EZ1® DSP Virus extraction kit on the EZ1 Advanced XL (Qiagen®) extractor. For PCR, we used specific Norovirus GI and GII primers and probes with specific Internal Control primers and probes (Light Mix® Modular Norovirus and EAV RNA Extraction Control, TIB MOLBIOL). Amplification was carried out using a COBAS Z 480 real-time thermal cycler (Roche®) according to manufacturer's recommendations. Epidemiological and clinical data was collected using an information sheet.

Results

In our study, Norovirus prevalence was 8.5% among the included patients. Among the infected group, individuals aged between 25 and 40 years accounted for the highest percentage (Figure 1) and Sex-Ratio M/F was 1.67. Predominant symptoms observed in infected patients included diarrhea (100%) and abdominal pain (100%), nausea (75%), fever (62%), vomiting (61.5%) and dehydration (37.5%). Hospitalization rates among positive cases were 37.5% in Center of Virology, Tropical and Infectious Diseases, 25% in Pediatrics, 25% in Gastroenterology and 12.5% in Internal Medicine. Analysis of risk factors revealed that diet like consuming meals that are not homemade (75%) and hygiene practices like no regular hand washing (25%) were the most commonly implicated modes of transmission.

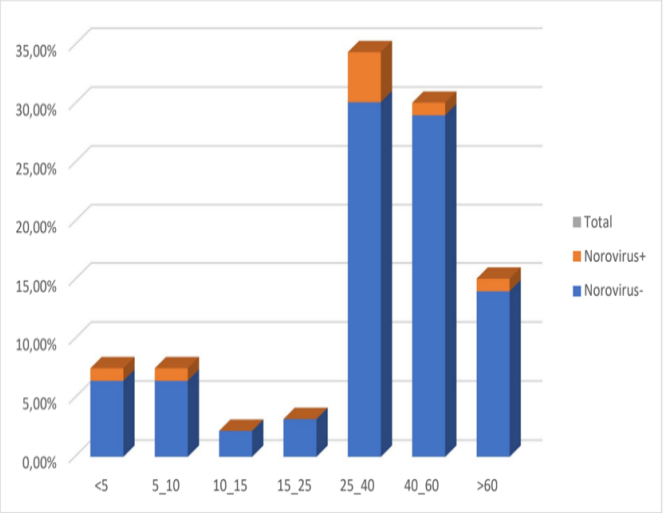

Figure 1: Age distribution of Norovirus-infected patients.

Discussion

Norovirus gastroenteritis infection is the second most widespread viral infection worldwide after Rotaviruses and accounts for 7 to 24% of foodborne infections globally (4). Our study investigated the prevalence of Norovirus infections among 94 patients presenting gastro-intestinal symptoms and recruited at the Mohammed V Military Teaching Hospital, Rabat, revealing an overall prevalence of 8.5%. This rate is lower compared to El Qazoui et al. (5), who reported a prevalence of 16% among 335 symptomatic Moroccan children under 5 years old. The infection rate observed in our study is similar to those recorded in several developing countries, such as Papua New Guinea (6% in 2014) (6). Higher prevalences have been reported in Qatar (28.47%), Djibouti (25.34%) (7) and in Bangladesh (18%) (8). In the MENA region, studies focusing on children have reported Norovirus infection rates ranging from 0.82% to 32.9%. For instance, Huynen et al. (9) found a prevalence of 24.8% among 293 symptomatic children in Bobo Dioulasso, Burkina Faso.

Our study observed a higher incidence among men (62.5%) compared to women (37.5%). This contrasts with a 2011 study by the Moroccan National Institute of Hygiene, which reported higher rates among girls (55%) than boys (45.07%) (4). Similarly, studies in Burkina Faso

and Belgium also showed varying prevalence rates between genders (9). Among age groups, individuals aged 25-40 years were most affected in our study, with a prevalence of 4.25%. This pattern aligns with findings from Iran and India, where higher infection rates were observed among adults aged 30-50 and 51-60 years, respectively (10, 11). In Belgium, older age groups (54-98 years) were predominantly affected (9).

Our study suggests that the higher Norovirus prevalence in individuals aged 25-40 years and the observed gender disparity, with more infections in men, may be related to differences in social behaviors and exposure risks. Adults in this age group may engage in activities that increase their risk of infection, while gender differences could be influenced by variations in hygiene practices and occupational exposures. Further research is needed to clarify these associations and identify the specific factors contributing to these patterns.

Norovirus-positive patients commonly experienced diarrhea, abdominal pain, nausea, and fever with vomiting, consistent with findings from Belgium and Bangladesh (7, 8). Higher infection rates correlated with poor dietary habits (75%) and inadequate hygiene (25%), echoing previous studies (12, 13). Additionally, patients frequently had hypertension (50%) and diabetes (37.5%) (14). Studies also observed heightened Norovirus infection risks among HIV-infected individuals and immunocompromised patients, including those with acute leukemia (15, 16).

Conclusion

Our study highlights the effectiveness of molecular detection methods, particularly RT-PCR, in accurately diagnosing Norovirus infections. Moving forward, there is a critical need for investment in research and development focused on effective vaccines and antiviral treatments tailored specifically to Norovirus. Such advancements are essential for mitigating the overall burden of Norovirus-associated gastroenteritis, improving public health outcomes, and reducing healthcare costs associated with the management of this highly contagious pathogen.

Conflict of interest: None

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