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# Investigation of Rota Virus Between Vaccinated and Unvaccinated Infants and Childern in Al-Najaf Governorate

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**Abstract**

*The study aims to investigate Rota virus in vaccinated and unvaccinated infants and childern in Al-Najaf governorate. To achieve this goal, collect 684 samples from Al-Zahraa Teaching Hospital for Maternity and Children in Al-Najaf governorate, through the period from 7 January 2024 A.D. to 1 December 2024 A.D. This study has revealed that the rota virus can be detected in stool samples from infants and children patients.The detection of Rota virus infections in samples has occurred by using immunochromatographic test (Rota virus rapid test kit). The Rota virus antigens has been detected in (463 out of 684) or (68%) in patients while remain as not found or negative result with virus (221out of 684) or 32%. The present study show the distribution of infants and children patients according to age. The age of patients with viral infections showed that the highest frequency was in age group A1 (23%) and the lowest frequency was in age group A4 and A5 (18%). All patients age group were selected in order to ensure comparable frequency distribution. In this study showed the symptomes that linked with rota virus infections in both vaccinated and unvaccinated cases, The first dose of rotarix vaccine show high percentage associated mild diarrhea (72%) and low percentage in other gastroentrites symptoms (12%). While the result with second dose of rotarix vaccine show high percentage associated other gastroentrites symptoms (87%) and low percentage in severe diarrhea (2%).*

## Introduction

Every year, rotaviruses, a leading cause of gastroenteritis in children, cause around half a million deaths. The WHO has advised that the national immunization program include a vaccine against the virus (World Health Organization, 2013).

The nine rotavirus species,sometimes colloquially referred to as groups, are A, B, C, D, F, G, H, I, and J. The Rotavirus A species is the most common one that infects humans, while the Rotavirus A–I species infect other animals (Hallowell et al., 2022; Crawford et al., 2017; Doro et al., 2017).

The most common cause of acute gastroenteritis in babies and young children globally is group A rotaviruses. Nearly all children have experienced at least one rotavirus illness by the time they are five years old (Burnett et al., 2017; Parashar et al., 2003; Aliabadi et al., 2019).

Rotaviruses are made up of eleven distinct double helix RNA (dsRNA) molecules, totaling 18,555 nucleotides. Numbered 1 through 11 according to decreasing size, each helix, or section, represents a gene (Leung et al., 2005). With the exception of gene 9, which codes for two proteins, each gene codes for one protein. Viral particles are up to 76.5 nm in diameter and are



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not enclosed, whereas the RNA is encased in a three-layered icosahedral protein capsid (Tate et al., 2012; Raini, 2015).

Six viral proteins (VPs) make up the virion, or virus particle, of the rota virus.They are known as VP1, VP2, VP3, VP4, VP6, and VP7 structural proteins. Apart from the VPs, rotavirus-infected cells are the only ones that create six nonstructural proteins (NSPs). NSP1, NSP2, NSP3, NSP4, NSP5, and NSP6 are the names of these (Velázquez, 2009; Lei et al., 2018; Shahidi et al., 2022).

Furthermore, it is common for a child to contract the same infection multiple times during their early years, however the symptoms of the second infection are usually less severe and the third is usually silent (Giaquinto et al., 2011; Thwaites et al., 2009; Stene et al., 2006). Rotavirus infections in adults are typically asymptomatic or moderate, while they can be rather serious in elderly or immunocompromised people (Marinosci et al., 2016). The virus spreads rapidly across the community because rotaviruses are excreted in the stools of both infected adults and children (Anderson & Weber, 2004; Omatola & Olaniran, 2022; Mafokwane et al., 2023).

Another important cause of nosocomial diarrhea is rotavirus (Hoffmann et al., 2011). This virus caused 440,000 deaths annually in the years before rotavirus vaccinations were developed (Patton, 2012; Cárcamo-Calvo et al., 2021; Uyar & Mızrakçı, 2022).

Every nation vaccinates infants against rotavirus. Two vaccinations are accessible:RotaTeq. Three doses of this vaccination are administered orally, usually at two, four, and six months. Adults and older children cannot receive the immunization. Rotarix. Infants receive two doses of this liquid vaccination at two and four months of age (Janko et al., 2022; Wilck et al., 2021).

According to studies, the vaccines are thought to be safe and effective, and each year they shield thousands of kids from contracting rotavirus. Rarely, though, they may result in an intestinal blockage that could be fatal if a portion of the intestine folds back on itself (intussusception) (Giaquinto et al., 2011).

After receiving the rotavirus vaccine, children who have previously experienced intussusception are at an increased risk of experiencing it again. Children with a history of intussusception should not receive the vaccine, according to the U.S. Food and Drug Administration.There is a very slight chance that intussusception could develop in children who have never had it before after receiving the rotavirus vaccine. Nevertheless, the advantages of the vaccine greatly exceed the disadvantages (Wakuda et al., 2011).

## Methods

Collect 684 samples from Al-Zahraa Teaching Hospital for Maternity and Children in Al-Najaf governorate, through the period from 7 January 2024 A.D. to 1 December 2024 A.D. There age range was from 3 months ≥ to 5 years The diagnosis was first recognized by clinical symptoms, and detection of rotavirus in stool samples.

Following the manufacturer's instructions, an immunochromatographic test (Rota virus rapid test kit: Figure 1) was used to detect the rotavirus antigen in stool samples. A rotavirus test kit is used to identify rotavirus-specific antigens, which helps diagnose rotavirus infection.

**Rotavirus test kit protocol:**

A stool sample is collected from the patient. The sample is applied to the designated area of the test device. A buffer solution is added. The test is allowed to develop according to the specified time on the packaging. The results can be observed and interpreted on the test device (Figure-1).



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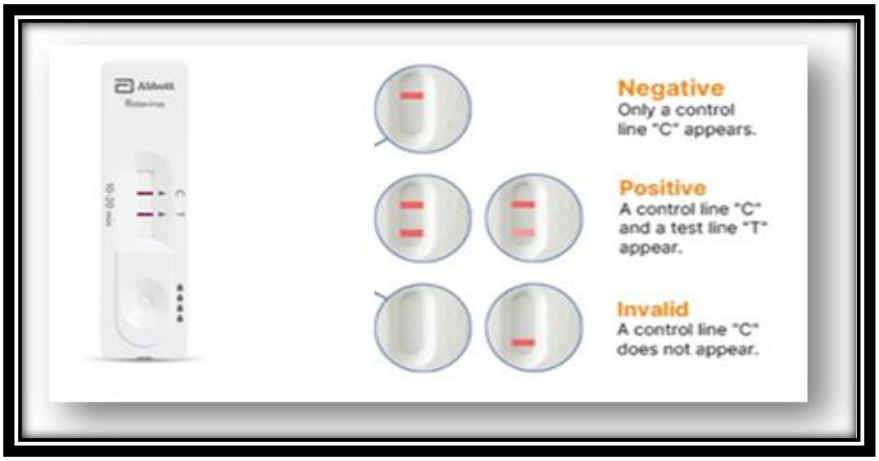


*Figure 1. Rota virus rapid test kit.*

**Ethical Committee**

This work was supervised and suggested by Al-Furat Al-Awast Technical University. All of the samples used in this study were obtained in accordance with the research procedures for each type, without the use of additional materials or modifications, and with approval from the Medical Ethics Committee of the Iraqi Ministry of Health.

**Statistical Analyses**

Software called Graphed Prism was used to perform statistical analyses. Chi square analysis was used to examine the patient groups. A *P*-value of less than 0.05 was considered statistically significant.

## Results and Discussion

This study has revealed that rota virus can be detected in stool samples from infants and children patients.The detection of Rota virus infections in samples has occurred by using immunochromatographic test (Rota virus rapid test kit).

The Rota virus antigens has been detected in (463 out of 684) or (68%) in patients while remain as not found or negative result with virus (221out of 684) or 32% as shown in figure -2.

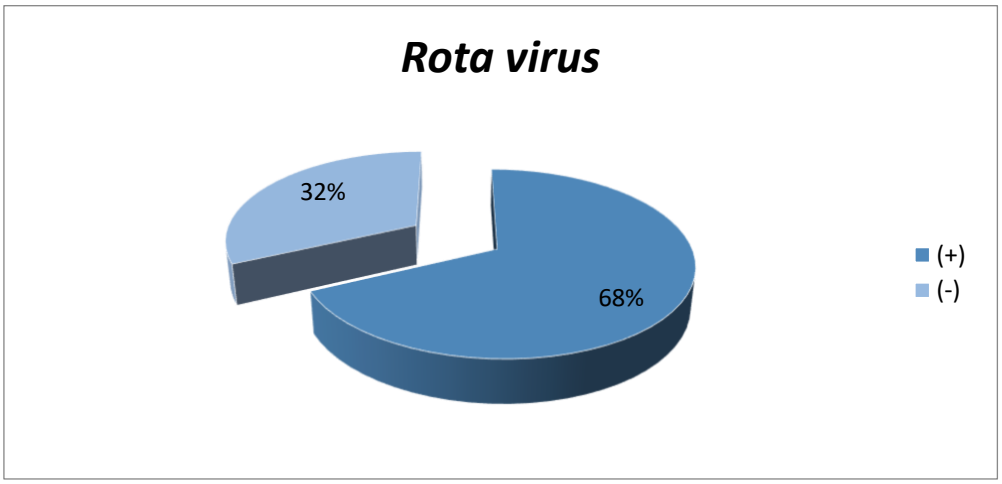


*Figure 2. Distribution of patients according to Rota virus infection.*

The present study show the distribution of infants and children patients according to age (Figure-3). The age of patients with viral infections showed that the highest frequency was in



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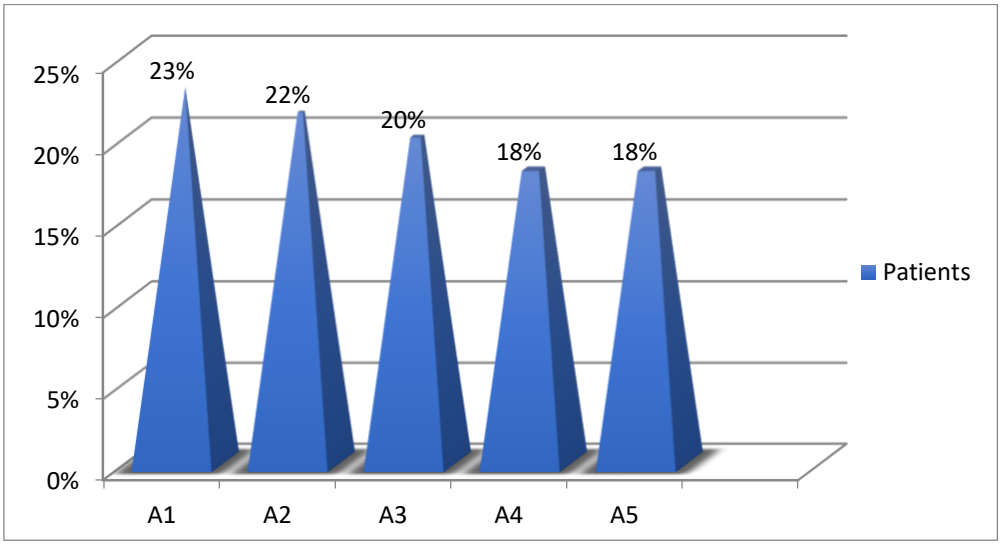
age group A1 (23%) and the lowest frequency was in age group A4 and A5 (18%). All patients age group were selected in order to ensure comparable frequency distribution.




- **A1: The group of patients with age (3 ≤12) months.**
- **A2: The group of patients with age (1-2) years.**
- **A3: The group of patients with age (2-3) years.**
- **A4: The group of patients with age (3-4) years.**
- **A5: The group of patients with age (4-5) years.**

*Figure 3. Distribution of Children patients, according to age.*

Also,this study showed in table-1 the symptomes that linked with rota virus infections in both vaccinated and unvaccinated cases, The first dose of rotarix vaccine show high percentage associated mild diarrhea (72%) and low percentage in other gastroentrites symptoms (12%). While the result with second dose of rotarix vaccine show high percentage associated other gastroentrites symptoms (87%) and low percentage in severe diarrhea (2%). The unvaccinted cases showed high percentage associated with severe diarrhea (82%) and low percentage in other gastroentrites symptoms (1%). Chi-square = 1431,4 and *P* value = 0.0001 among study groups distribution.

Table 1. Showed Total Rota virus infections to infants and children. P>0.05.

| **Total Rota virus (+) 463 (68%)** | **Severe diarrhea** | **Mild diarrhea** | **Other gastroenteritis symptoms** | **Chi-Square P-Value** |
|---|---|---|---|---|
| Vaccine (First dose) | 72 (16%) | 335 (72%) | 56 (12%) | $\chi^2$ =1431,4 $P$ = 0.0001 |
| Vaccine (Second dose) | 11 (2%) | 50 (11%) | 402 (87%) | |
| Unvaccinated | 380 (82%) | 78 (17%) | 5 (1%) | |

Around the world, rotaviruses are the leading cause of severe diarrheal illness in infants and young children, making up between 30% and 50% of acute diarrheal illnesses (Bern et al., 1992). As rotavirus vaccinations become more accessible and incorporated into the standard of care in some nations, typing of circulating strains is starting to take place globally. One-third (36.5%) of the children with acute diarrhea in our series had rotavirus infections. Of the 100



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rotavirus ELISA-positive specimens, 27 were PCR-negative, as was indicated in the results section. These were false-positive samples. Stool particles can occasionally result in an ELISA test that is falsely positive (Greenberg & Estes, 2013). 34.5% of children in cross-sectional studies of infants and young children with diarrhea over an 8-year period shed rotavirus in their feces, according to Brandt et al. (Brandt et al., 1983), which is consistent with our findings. Rotaviruses have been found in symptomatic children under five years old at comparable high rates, according to reports from other nations (Li et al., 2010). Other findings are comparable to those from other nations, such as India (36.9%). Iran, including Tehran (35%), Jahrom (46.2%), Zanjan (31.5%), and Isfahan (30.8%), as well as Bangladesh (40–47.4%), Thailand (43.6%), Turkey (36.1%), Pakistan (34%), Jordan (33%), Kuwait (40%), and a number of Iranian cities (Sungkapalee et al., 2006), Despite being higher than the Venezuelan figures (21.3%) The WHO-coordinated global rotavirus surveillance network also reports that the median global rotavirus detection rate across 48 countries was 40% (Greenberg, & Estes, 2009). According to another study, children under the age of two accounted for 60 (82.2%) of all rotavirus cases (Kargar et al., 2012).

## Conclusion

Although the effectiveness of rotavirus vaccinations in lowering the risk of severe rotavirus infection has been extensively studied, vaccines can occasionally cause symptomatic rotavirus infection. Additionally, the findings can help shape public health plans to increase vaccination rates and lower rotavirus-related morbidity and mortality in Al-Najaf governorate.

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