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*Full Length Research Paper*

# Astrovirus Infection Prevalence Among Children in Nasarawa State, Nigeria

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**This study was conducted to determine the prevalence of astrovirus involved in gastroenteritis among children in Nasarawa State, Nigeria. A total of 144 stool samples were collected from diarrheic children in two major hospitals in the state. The stool samples were screened for possible detection of astroviruses, using Enzyme Linked Immunosor-bent assay. Twenty three (23) were found positive, representing 16%. Male children had higher prevalence compared to their female counterpart. Children within the age group 0 – 1 year recorded higher 8.30% prevalence compared to other age groups. It was observed that children that drink water from well had more prevalence than those that drink water from other sources. Chi square test revealed no significant relationship between sex, age, water sources and the rate of infection. More awareness on the route of transmission should be intensified.**

**Keywords:** Astrovirus, Infection in Children.

## INTRODUCTION

Human astroviruses have been identified as one of the most frequent causes of infantile gastroenteritis, second in incidence only to rotavirus (Aminu *et al.*, 2008). Astrovirus occur worldwide accounting for about 2% - 16% of diarrhea in the community. The viruses are far more common than previously thought and their clinical significance continues to generate interest (Aminu *et al*., 2008; Guix *et al.*, 2005).

The name astrovirus was derived from the Greek word astron and was used to describe small round viruses detected by electron microscopy in the stool of infants (Ayolabi *et al.*, 2012). Astrovirus is 27 – 34nm in diameter with the genome consisting of single stranded RNA. The virus particle has smooth or slightly indented outer electron dense shell with an inner star shaped core (Brown *et al.*, 2008; Ayolabi *et al.*, 2012).

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The occurrence of astrovirus infection varies depending on the season. In temperate climates infection is during the rainy season. The variation in the seasonal infection rate particularly in temperate regions is not clearly under stood. This study therefore was an attempt to investigate the prevalence of astrovirus infection among children in Nasarawa State of Nigeria.

## MATERIALS AND METHODS

### Description of the Study Area

Nasarawa State is in North Central, Nigeria. Its capital is Lafia. Nasarawa State was created on 1st October, 1996 from Plateau State. The State is bounded in the North by Kaduna State, in the West by the Federal Capital Territory in the South by Kogi and Benue States and in the East by Taraba and Plateau. The State has a land area of 27,117

**Table 1.** Infection Rate of Astrovirus According to Sex.

| Sex | Number of Stool Samples Screened | Number of Positive Stool Samples | Prevalence (%) |
|---|---|---|---|
| Male | 70 | 16 | 11.10 |
| Female | 74 | 7 | 4.90 |
| **Total** | **144** | **23** | **16.00** |

**Table 2. Infection Rate of Astrovirus According to Age**

| Age | Number of Stool Samples Screened | Number of Positive Stool Samples | Prevalence (%) |
|---|---|---|---|
| 0 – 1 | 60 | 12 | 8.30 |
| 2 – 3 | 40 | 8 | 5.60 |
| 4 – 5 | 44 | 3 | 2.10 |
| **Total** | **144** | **23** | **16.00** |

square kilometers with a population of 2,040,097 (2006, census). It is endowed with mineral deposits such as salt and bauxite. The major occupation of inhabitants is farming.

### Sample Size Determination

The sample size for this study was determined by the formular:

$$S = \frac{t^2 \cdot p(1 - p)}{m^2}$$ (Aminu *et al*., 2008)

Where S = Sample size
t = Confidence level at 95% = 1.96
p = National Prevalence
m = Marginal error at 0.05

### Sample Collection

One hundred and forty four (144) stool samples were collected from diarrheic children at 3 hospitals (Federal Medical Center Keffi, General Hospital Akwanga and Keffi General Hospital). Ethical clearance was sought for from the 3 hospitals ethical committees before the commencement of the collection of the stool samples. The stool samples were collected and transported to the Microbiology Laboratory, Federal University of Technology, Minna, Niger State and stored under frozen (-20$^{o}$C)condition for further analysis (Aminu *etal.*, 2008, Ayolabi *et al*., 2012).

### Screening of the Stool Samples for Astrovirus Detection

The stool samples were diluted separately. 10% of the suspension from each of the stool samples was screened for possible detection of astrovirus using Enzyme Linked Immunosorbent Assay (ELISA). This was done following the manufecturers instructions. The results obtained were compared to the positive and negative control.

### Statistical Analysis

Data generated from the study and the demographic information about the patients were analysed using chi square test and the level of significance was determined at P>0.05.

## RESULTS

Out of the 144 stool samples screened for possible detection of astrovirus, only 23 stool samples were positive representing 16% prevalence. Male children recorded higher prevalence compared to their female counterparts (Table 1).

Children within the age group 0 – 1year had more rate of infection compared to other age groups (Table 2).

In the same vein children whose source of water is from well had more infection rate compared to the children whose source of water is from Borehole and Tap (Table 3).

**Table 3.** Infection Rate of Astrovirus According to Water Source.

| Source of Water | Number of Stool Samples Screened | Number of Positive Stool Samples | Prevalence (%) |
|---|---|---|---|
| Well | 58 | 12 | 8.30 |
| Boreholes | 53 | 5 | 3.50 |
| Tap | 33 | 6 | 4.20 |
| **Total** | **144** | **23** | **16.00** |

**Table 4. Relationship Between the Rate of Infection and Demographic Information of the Diarrheic children**

| Age | Number of Positive Stool Samples | P-value |
|---|---|---|
| **Sex** | | |
| Male | 16 | 0.642 |
| Female | 7 | |
| **Age** | | |
| 0 -1 | 12 | 0.465 |
| 2 – 3 | 8 | |
| 4 – 5 | 3 | |
| **Source of Water** | | |
| Well | 12 | 0.569 |
| Borehole | 5 | |
| Tap | 6 | |

Table 4 indicates the relationship between the rate of infection and the possible risk factors which revealed that none of the risk factors was related to the rate of infection.

## DISCUSSION

In this study, the prevalence of astrovirus involved in gastroenteritis among children in Nasarawa State was determined to be 16%. This is on the high side when compared to the prevalence reported by Aminu *et al.* (2008) in North Western Nigeria. The high prevalence observed in this study could be attributed to poor sanitary condition of the environment.

Male children recorded more rate of infection compared to their female counterpart (Table 1). Although, there seems to be difference in that the infection rate between the male children and the female children, chi square test showed the difference was not significant at p = 0.642 (Table 4). Ayolabi *et al.* (2012) has reported similar incidence in Lagos State, Nigeria. Therefore, the outcome of this study corroborate the report of Ayolabi *et al.* (2012).

The rate of infection with astroviruses was observed to be high among infants (0 – 1 year) (Table 2). Similar studies by Aminu *et al.* (2008) and Ayolabi *et al.* (2012) reported high prevalence of astrovirus infection among infants (less than one year) in North-western Nigeria and Lagos State respectively. In this study children within the age group 0 – 1year recorded high prevalence of infection as indicated in Table 2. This makes the result of the present study comparable with the previous reports by Aminu *et al.* (2008) and Ayolabi *et al.* (2012). However, chi square test revealed that age was not a factor behind the rate of infection with astroviruses at p = 0.465 (Table 4).

Similarly, it was observed that children that drink water from well had high infection rate compared to others (Table 3). This could be attributed to contamination due to exposure or as a result of human activities during fetching of the water from the well.

Despite the differences in the infection rates with respect to water sources, chi square test indicated that there was no significant difference. Hence different water sources is not a factor in the infection with astrovirus at p = 0.569.

More awareness campaign need to be encouraged among populace by public health practitioners.

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