

**SHORT COMMUNICATION****EPIDEMIOLOGY OF ASTROVIRUS INFECTION AMONG CHILDREN (0 – 5YEARS) IN NIGER STATE, NIGERIA****Kuta, F.A. Adabara, N.U. and Abdulsalam, R.**

Department of Microbiology, Federal University of Technology, Minna, Niger State.

Email: farukkuta@gmail.com

(Received: April, 2014; Accepted: June, 2014)

**ABSTRACT**

The prevalence of astrovirus infection among children (0–5years) in Niger State was investigated and determined to be 7.6%. Male children had high prevalence (4.6%) compared to their female counterparts (3%). Similarly, children within the age group 0 – 1 year recorded the high (4.04%) prevalence compared to other age groups. It was observed that children from rural areas of the state had prevalence of 5.1% while those from urban areas recorded 2.5%. At the rainy season, the prevalence of infection was 5.6% and in the dry season the prevalence was low (2.0%). Chi square test revealed that there was no link between sex, age, location of residence, seasonal variation and astrovirus infection among children in Niger State. Hospital and community base studies should be encouraged in order to ascertain the true picture of the prevalence.

**Keywords:** Epidemiology, Astrovirus, Children, Gastroenteritis, Prevalence, Infection.

**INTRODUCTION**

Astroviruses belong to the family Astroviridae. The virus was first discovered in 1975 using electron microscope following an outbreak of diarrhea in human (Madeley and Cosgrove, 1975). Since 1975, the virus has been one of the leading causes of gastroenteritis in human particularly children.

Astroviruses are 28–35nm in diameter, icosahedral that have a characteristic five or six pointed star-like surface structure when viewed by electron microscopy. Along with the picornaviridae and the caliciviridae, the Astroviridae comprise a third family of non enveloped viruses whose genome is composed of plus sense, single stranded RNA (Brown *et al.*, 2008). Astrovirus infection is not usually a severe situation and only in some rare cases leads to dehydration. Infected people do not need hospitalization because symptoms reduce by themselves after a short period (Madeley, 1988). The main symptoms are diarrhea, followed by nausea, vomiting, fever, malaise and abdominal pain. Previous studies have shown that the duration of the symptoms are approximately three – four days. Humans of all ages are susceptible to astrovirus infection, but children, the elderly and those that are immuno-compromised are most prone. The majority of children have acquired

astrovirus antibodies by the age of 5 and looking at the pattern of the disease, it suggests that antibodies provide protection through adult life, until the antibody titre begins to decline later in life (Koopmans *et al.*, 1998; Midthun *et al.*, 1993).

Astroviruses are associated with 5% - 9% of cases of gastroenteritis in young children. The occurrence of astrovirus infection varies depending on the season. In temperate climates infection is high during winter months. The main mode of astrovirus transmission is by contaminated food and water (Glass *et al.*, 1996). This study was an attempt to determine the prevalence of astrovirus infection associated with gastroenteritis among children in Niger State.

**Materials and Methods****Sample Size Determination**

The sample size for this study was determined using the formular below

$$S = \frac{t^2 \times P(1 - P)}{m^2}$$

Where S = Sample size

t = Standard normal deviate at 1.96

P = Prevalence

m = Marginal tolerable error

### Stool Sample Collection

A total of 198 stool samples were collected from children presenting diarrhea in four major hospitals (Minna General Hospital, Umaru Sanda Ndayako General Hospital Bida, Suleja General Hospital, and General Hospital Kontagora) in Niger State. The stool samples were collected after obtaining clearance from the Ethical Committees of the four hospitals. The stool samples were collected into sampling bottles and were immediately transported to the Microbiology Laboratory, Federal University of Technology, Minna and kept under frozen (4°C) condition for further analysis (Aminu *et al.*, 2008).

### Screening of the Stool Samples for Astrovirus

All the 198 stool samples were screened, using Enzyme Linked Immunosorbent Assay (ELISA),

manufactured by Creative Diagnostic Laboratory in the United States of America. The screening of the stool samples was done in accordance with manufacturers specifications.

### Statistical Analysis

Data generated from the study was analyzed using chi square test and the level of significance was determined at  $P > 0.05$ .

### RESULTS

Out of the 198 stool samples screened for the possible detection of astroviruses, 15 stool samples were found positive representing 7.6% prevalence. Male children recorded more prevalence than their female counterparts (Table 1)

Table 1: Prevalence of Astrovirus Infection according to Gender

Sex	Number of Stool Sample Screened	Number of Positive Stool Samples	Prevalence (%)
Male	98	9	4.6
Female	100	6	3.0
Total	198	15	7.6

$\chi^2 = 0.562$  at  $p > 0.486$

Children within the age group 0 – 1year recorded 4%, those within 2 – 3years had 2% while those within 4 – 5years had 1.52% (Table 2).

Table 2: Prevalence of Astrovirus Infection according to Age

Age	Number of Stool Sample Screened	Number of Positive Stool Samples	Prevalence (%)
0 – 1	72	8	4.04
2 – 3	60	4	2.02
4 – 5	66	3	1.52
Total	198	15	7.6

$\chi^2 = 0.612$  at  $p > 0.343$

Out of the 15 positive stool samples recorded, 5.1% prevalence was recorded for children from rural settlement of the study areas while 2.5%

prevalence was recorded for children from urban areas of Niger State (Table 3).

**Table 3: Prevalence of Astrovirus Infection according to Location of Residence**

Location of Residence	Number of Stool Sample Screened	Number of Positive Stool Samples	Prevalence (%)
Rural	88	10	5.1
Urban	110	5	2.5
Total	198	15	7.6

$\chi^2 = 0.473$  at  $p > 0.272$

During rainy season the prevalence was high (5.6%) compared to the dry season (2%) (Table 4).

**Table 4: Prevalence of Astroviruses Infection according Seasonal Variation**

Season	Number of Stool Sample Screened	Number of Positive Stool Samples	(%) Prevalence
Rainy	103	11	5.6
Dry	95	4	2.0
Total	198	15	7.6

$\chi^2 = 0.353$  at  $p > 0.478$

Table 5 indicates the relationship between the rate of infection and demographic information about the children screened.

**Table 5: Relationship between Demographic Information and the Rate of Infection**

Demographic	Number of Positive Stool Samples	P-Value
<b>Sex</b>		
Male	9	0.486
Female	6	
<b>Age</b>		
0 – 1	8	0.343
2 – 3	4	
4 – 5	3	
<b>Location of Residence</b>		
Rural	10	0.272
Urban	5	
<b>Seasonal Variation</b>		
Rainy	11	0.478
Dry	4	

## DISCUSSION

In this study the prevalence of astrovirus among children in Niger State was determined to be 7.6%. The prevalence recorded in this study is slightly higher compared to the prevalence reported in previous studies by Aminu *et al.* (2008).

The prevalence of astroviruses among male children was higher compared to their female counterparts. Despite the differences, chi square test revealed that the difference was not significant at  $P > 0.05$ . The outcome of this study makes it comparable with the report by Ayolabi *et al.* (2012).

Similarly, the infection rate seems to be higher among children within the age 0–1 year compared to other age groups. This could be due to premature nature of the body defenses as earlier observed by Ayolabi *et al.* (2012). Though astrovirus can infect even adults, the fact that infants were more affected in this study gives room to speculate that it could be attributed to impaired body defenses. However, chi square test revealed that age of the children was not a factor in astrovirus infection.

The rate of infection with astrovirus in the rural areas was observed to be high. This may be attributed to poor hygienic practices coupled with poor water quality peculiar to rural settlements. Despite the difference in the infection rate, chi square test revealed that infection with astroviruses is not connected to the quality of environment in the study areas.

The prevalence of infection with astroviruses was observed to be high during the rainy season compared to the dry season. This can be explained by the impact of the rain particularly on breakdown of sanitation in developing countries like Nigeria. Despite the differences observed, chi square test revealed that seasonal variation is not a factor in the rate of infection with astrovirus. Hospitals and community-based studies should be encouraged in order to ascertain the true picture of the prevalence in the study areas.

## REFERENCES

- Aminu, M. Esona, M.D., Geyer, A. and Steels, A.D. 2008 Epidemiology of Rotavirus and Astrovirus Infections in Children in North Western Nigeria. *Annals of African Medicine* 7(4): 168–174.
- Ayolabi, C.I., Ojo, D.A. and Akpan, I. 2012. Astrovirus Infection in Children in Lagos, Nigeria. *African Journal of Infectious Diseases*. 6(1): 1–4.
- Brown, D.W., Gunning, K.B., Henry, D.M. 2008. A DNA Oligonucleotide Microarray for Detecting Human Astrovirus Serotypes. *Journal of Virological Methods* 147(1): 86–92.
- Glass, R.I., Noel, J., Mitchell, D. 1996. The Changing Epidemiology of Astrovirus Associated Gastroenteritis a Review. *Arch Virological Suppl.* 12:287–300.
- Koopmans, M.P., Bijen, M.H., Monroe, S.S., Vinje, J. 1998. Age Stratified Seroprevalence of Neutralizing Antibodies to Astrovirus Types 1 – 7 in Humans. *Clinical Diagnosis Lab. Immunol.* 5(1): 33–37.
- Madeley, C.R., Cosgrove, B.P. 1975. 28nm Particles in Faeces in Infantile Gastroenteritis. *Lancet* 2(7932): 451 – 452.
- Madeley, C.R. 1988. Virus Diarrhoea in Hospital. *Journal of Hospital Infection* 12(3): 145 – 149.
- Midthun, K., Greenberg, H.B., Kurtz, J.B., Gary, G.W., Lin, F.Y., Kapikian, A.Z. 1993. Characteristics and Seroepidemiology of a type 5 astrovirus associated with an outbreak of gastroenteritis in Marin County California. *Journal of Clinical Microbiology* 31(4): 955–962.