

Group A Rotavirus Infection In Children Under 5 Years Of Age In Wamako Local Government, Sokoto State, North Western Nigeria

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Abstract: The aim of this community based study was to determine the intensity of RVA infection in the study area and the array of clinical signs associated with this infection. 188 faecal samples were collected between April and August 2016, a questionnaire was administered to obtain sociodemographic data and clinical signs and symptoms, 96/188 samples analysed for faecal rotavirus antigen by ELISA turned out positive giving rise to a prevalence rate of 51%. 49/96(50.5%) of the positive samples were from male children while 47/96 (49.5%) were females, there was no significant statistical association between gender ($X^2 = 0.13, df=1, p=0.7134$) and RVA infection, prevalence was highest among age group 13 -24 months (42%), closely followed by age group 0 -12 months(32.2%), there was significant statistical association between age and RVA infection $x^2=20.69, df=4, p=0.0004$. Vomiting was present in 71/96(74%), fever was observed in 50/96 (52%) of the children, most of the diarrhea cases (36.5%) lasted for a period of 5-6 days, and 37% of the children were reported to pass diarrhea 4 to 6 times a day. Lethargy was observed in 62/96(64%) of the cases, this study found significant statistical association between vomiting ($p=0.004$), duration of diarrhea ($p<0.0001$), frequency of diarrhea ($p<0.0001$), and RVA infection while the study did not find statistical association between RVA infection and fever ($P=0.4152$), as well as lethargy.

I. BACKGROUND AND INTRODUCTION

Human rotavirus was identified as an aetiological agent of gastroenteritis only about forty years ago in Melbourne Australia (Bisho et al.,1974) rotavirus had successfully earned and maintained the reputation of being the single leading cause of severe infantile diarrhea globally. Mortality and morbidity due to Rotavirus is however limited to developing countries especially in South East Asia and Sub Saharan Africa

Rotavirus infection is attributable 5270 000 deaths annually globally, with 145 thousand occurring in sub Saharan Africa (Aminu et al.,2008) and 33 000 deaths annually in

Nigeria.(Aminu) . This is likely an underestimation because only hospital based studies have been considered. Nearly every child would have been infected by second year of life regardless of the location. A number of studies across the geopolitical zones in Nigeria have reported prevalence rates of 25% and above.

Such as 36% in Kano (Aminu et al, 2016), 55.9% in Ilorin (Omidayo et al 2008), 54% in Dutsinma (Joseph et al 2016) 56.4 in Enugu (Tagbo et al)

Rotavirus is a genus belonging to the family Reoviridae. They have an unusual double stranded segmented RNA encapsidated by of three concentric icosahedral protein layers. The The outer layer of the TLP is made up of the viral protein

7(VP7) which is a glycoprotein designated as {G} and viral protein 4(VP4) which is protease sensitive [P], the middle layer VP6

The intermediate layer is formed by the VP6 protein, (Desselberger,2014) VP6 determines the grouping of the genus rotavirus into species A to H, and I and II subgroups within group A rotavirus.

II. MATERIALS AND METHODS

STUDY DESIGN

The study is a cross sectional descriptive study.

STUDY AREA

This study was conducted in Wammako local government area, sokoto state North Western Nigeria.

SAMPLE COLLECTION

Faecal samples were collected from children under five years resident in the study area, not admitted in a hospital presenting with symptoms of diarrhea. Samples were collected by simple random sampling in a sterile universal container and transported to microbiology laboratory UDUTH where they were refrigerated until analysis.

SAMPLE ANALYSIS

Samples were analysed for the presence of rotavirus faecal antigen by commercially available ELISA kit Accudiag sensitivity 100 % and specificity 97.1% was used to detect the presence of rotavirus faecal antigen according to manufacturer's instruction.

III. RESULTTS

Results	Frequency	Percent (%)
Positives	96	51
Negatives	92	49
Total	188	100.0

Table 1.1: prevalence of Group A rotavirus among diarrheic children in Wammako local government

Gender	No.of positive	Percentage pos (%)
Male	49	50.5
Female	47	49.5
Total	96	100

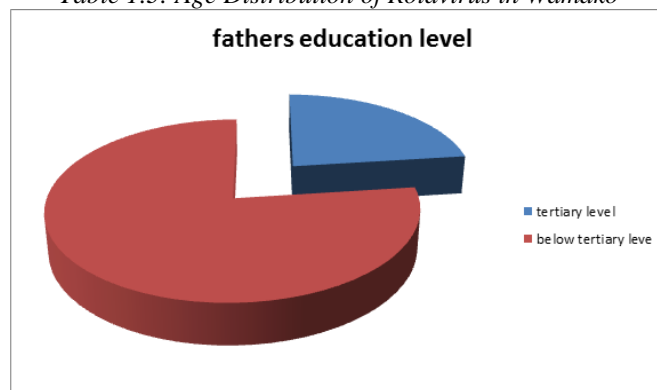
$p=0.7134, X^2=0.13, df=1$

Table 1.2: Gender Distribution of Rotavirus Diarrhea in Children in Wamako

Age group (months)	Number tested	Number positive	Percentage positive (%)
0 – 12	58	31	32.2
13-24	58	40	42
25-36	35	14	14.6
37-48	24	4	4.2
49-60	13	7	7

Total	188	96	100
$X^2=20.69, df=4, p=0.7134$			

Table 1.3: Age Distribution of Rotavirus in Wamako



$X^2=1.16, df=1(p=0.311)$

Figure 1: Prevalence of RVA in sokoto according to the fathers educational level

Vomiting	No.of positive	Percentage positive (%)
Yes	71	74
No	25	26
Total	96	100

($p=0.004$) Chi square =11.79,df=1

Table 1.4: distribution of vomiting in rotavirus diarrhea in children in wamako

Fever	No.of positive	Percentage positive (%)
Yes	50	52
No	46	48
Total	96	100

$X^2=0.66, df=1(P=0.4152)$

Table 1.5: distribution of fever in rotavirus diarrhea in children in Wammako local government

Duration of diarrhea in days	No. positive	Percentage positive (%)	Cumulative percentage (%)
1-2	18	18.8	18.8
3-4	29	30.2	39.3
5-6	35	36.5	85.6
7-8	14	14.5	100
Total	96	100	

($p<0.0001$) $X^2=36.09, df=3$.

Table 1.6: duration of diarrhea in rotavirus infection in children in wammako

Frequency of diarrhea	No.positive	Percentage positive (%)	Cumulative percentage
up to 3 times	23	24	24
4-6	36	37	61
7-9 times	17	18	79
>9 times	20	21	100
Total	96	100	

($p<0.0001$) $X^2=21.7, df=3$

Table 1.7: Frequency of diarrhea among children with RVGE in Wamako

Lethargy	Frequency	Percentage positive	Cumulative percentage
Yes	62	64.4	64.4

No	18	19	83.4
No response	16	16.6	100
Total	96	100	

$$X^2=1.12, df=1(p=0.2960)$$

Table 1.8

IV. DISCUSSION CONCLUSION AND RECOMMENDATION

DISCUSSION

In this study, 96(51%) out of the 188 diarrheic children tested were found to be positive while 92/188(49%) tested negative for rotavirus. Thus the prevalence of rotavirus diarrhea among children not admitted in hospitals in Wammakois 51%. This result is fits into the current trends of rotavirus infection in Nigeria in which 25 to 50% or even more of samples analyzed in studies turn out positive. Some of these findings include; 56% in Enugu (Tagbo *et al* .,2013,) 55.9% in Ilorin (Odimayo *et al* 2008), 54% in Dutsinma (Joseph and Godwin,2016) 36.4 in Kano (Aminu *et al*,2016) 34.5% in Ife, (Oluwatoyin *et al* 2012) 32% in Kaduna (Muhammad *et al* 2016), the findings are however in tandem with findigns of Mukhtar *et al* (2016) who reported a prevalence of 5.3% in Katsina, and Kuta *et al* (2014) in three North central states and FCT.

47 out of 95(49.5%) females tested positive whereas 49 out 93(50.5%) tested positive. Chi square did not show any association between gender and occurrence of rotavirus infection ($p=0.7134$),this finding is consistent with that of Alkali *et al* 2012 in sokoto.and not in agreement with a report in Jos Junaid *et al*,2013 and Kaduna(Muhammad *et al*., 2016) which indicated that male children shed RVA at a significantly higher rate . Age is a very important parameter in studying rotavirus infection. In this study, the burden of RVGE appeared to be disproportionately borne among different age groups, of the 96 subjects that tested positive, age group 13-24 months recorded the highest prevalence of 42%, closely followed by age group 0-12 months with 32.2%, then age group 25-36 months with 14%., the age groups 37-48 and months and 49-60 months with 7% and 4.2% respectively. When compared with negatives, the prevalence appeared to be reducing as the children got older. The symptoms also seemed mildest in age groups 49-60 months and were most severe in age group 0-12 months. Chi square showed significant association between rotavirus and age.($p=0.0004$).further discrimination among different age groups under 5 years of age is consistent in most reported studies on rotavirus infection in children. However some reports such as that by, Oluwatoyin *et al* 2012 in Ifeh reported higher prevalence in children aged 0-12 months, while Alkali *et al* 2012 in Sokoto reported higher prevalence in age groups 13 to 24 months. Generally the burden is borne the most by children under two years of age.

The results shows that rotavirus infection was seen more among children whose fathers educational level is below tertiary level (77%), as opposed to 23% seen in children whose fathers educational level is above tertiary level. Chi square however did not show significant association between

RVA infection and father's educational level ($p=0.311$). This disparity is simply high because there were very few household heads whose educational level is actually up to tertiary level. Majority of the recent findings on RVA infection shows that Rotavirus infection occurs irrespective of fathers educational level, mothers educational level, socioeconomic status, nature of diet and drinking water,

In this study, 71 out 96(82%) children that tested positive for Rotavirus, appeared to have vomited at least once during the course of diarrhea while 25(18%) of the children (mostly older children) were not emetic during the course of the infection. In most cases vomiting preceeded diarrhea after 24 to 48 hours and lasted in most cases for 48hours. However not tangible data were generated on episodes of vomiting per day. Chi square found significant association between vomiting and RVA infection ($p=0.004$). This finding is in agreement with findings in Enugu (Tagbo *et al*, 2013) and in Sokoto (Alkali *et al* 2012)

In terms of fever, 50/96 of the children (52%) that tested positive for rotavirus were pyretic at one point during the course of the infection, while 46/96 children (48%) were not pyretic during the course of the diarrhea, pyrexia appeared to be almost evenly distributed in all the age groups, Chi square analysis did not show any significant association between rotavirus diarrhea and pyrexia ($P=0.4152$). This is in agreement with findings in Enugu (Tagbo *et al*, 2013) and not in agreement with findings in Jos (Junaid *et al*, 2013)

Diarrhea lasted (4 -6) days, this finding is in agreement with findings in Jos(Junaid *et al*, 2013) in majority of the children that tested positive (37.5%) for Rotavirus, and majority of these children are below 12 months, even though this range (4-6) may be not the longest diarrhea can last in other cases, it is still long enough to cause severe dehydration and electrolyte loss in young children, it's no surprise therefore that rotavirus is the leading cause of high rate of morbidity and mortality among other agents of gastroenteritis, because diarrhea caused by other significant aetiologic agents mostly affects older children, and even if younger are affected, there is usually not much discrimination in symptoms among different age groups, but rotavirus discriminates and cause milder symptoms in older children and severe symptoms in younger children who are yet to acquire immunity to the rotavirus strains circulating in their environment. Statistical analysis of data generated in this study on duration of diarrhea shows significant association between rotavirus infection and duration of diarrhea. ($p<0.0001$). This finding is in agreement with findings in Kaduna (Muhammad *et al* 2016)

With regards to number of diarrheal episodes in 24 hours, The result showed that majority of the children infected with RVGE pass looser than normal stools 4-6 times within 24 hours(based on the information provided by the mothers), frequency of diarrhea appeared to be statistically associated with rotavirus infection ($p<0.0001$), Chi square =21.7,df=3.

CONCLUSION

Rotavirus was detected at a significantly high rate (51%), this infection was seen discriminating among the various age groups under five years, with peaks seen in age group 13-24 months followed by age group 0-12 months, this finding

implies that Rotavirus diarrhea is silently ravaging the children in the community, with greater morbidity in children under two years of age irrespective of their gender.

Besides diarrhea, the most predominant clinical symptom is vomiting, mostly lasting for 48 hours, fever appeared to be proportionately distributed among the rotavirus positive and rotavirus negative subjects. Diarrhea lasted longer in children that tested positive for rotavirus and frequency of stooling was equally higher in the positive subjects, but lethargy was recorded in both positive and negative subjects.

RECOMMENDATION

Hospital based surveillance should be complemented more often with community based surveillance to better understand the disease burden, since the disease burden is more in malaria endemic area, the synergistic relationship between malaria and RVA infection should be studied.

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