

Original Research Article

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Bacteriological Study of Diarrheas in Children

J. Srinivasarao, Chinnoutpalli, D. Varalakshmi and D. Sarada*

Department of Microbiology, Siddhartha Medical College, Vijayawada, Andhra Pradesh, India

*Corresponding author

ABSTRACT

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Diarrheas are one among the commonest causes of morbidity and mortality in children in developing countries like India. Children below the age group of 5 years in rural areas and of low socio-economic status are most commonly affected due to various reasons like unprotected water supply, poor personal hygiene, illiteracy and malnutrition. The Study was conducted on 100 children below the age group of 12 years to identify the prevalent organism causing diarrhea in Guntur. Stool samples were processed and the causative agent was identified using standard microbiological techniques. Male children were affected more than female children and the commonest age group involved was 0-5 years. Incidence was common in rural population and in low-socioeconomic group. *Escherichia coli* was the commonest isolate with an incidence rate of 54% followed by *Klebsiella* (17%), *Pseudomonas*, *Salmonella*(1% each) and mixed infection with *Escherichia coli* and *Klebsiella*(6%). Most of the isolates were sensitive to Ciprofloxacin, Norfloxacin and Gentamycin. On follow-up, recovery rate was 95% and mortality rate was observed to be 5%. The isolate and the antibiotic sensitivity pattern helps the paediatrician in treating children with complaints of diarrhea.

Introduction

In developing countries like India, diarrheas are one of the commonest causes of morbidity and mortality among children. The incidence and mortality is high in Rural areas and unhealthy localities of Urban areas mainly due to poverty, illiteracy, bad personal hygiene, lack of health education and other factors. About 1.5 million children under the age group of five years die every year owing to acute diarrhea. Diarrheal diseases cause a heavy economic burden on health resources, as children with such diseases occupy about 15% of Paediatric beds in some developing countries.

An individual below 12 yrs of age was considered as a child for the study. A child suffers on an average 10 to 15 episodes of diarrhea and of these, three to five occur in the first five years of life. A child with multiple episodes of diarrhea suffers from most severe form of protein energy malnutrition.

About 5% of diarrhea cases in the community become chronic and last more than 2 weeks. Persistent colonization of upper small intestines by microbes, Dietary allergies, Carbohydrate intolerance caused

by damage to the brush borders of intestinal mucosa resulting in low levels of disaccharidases, Infant and children with decreased host immunity, delayed repair of intestinal damage because of associated protein energy malnutrition are more prone to suffer protracted diarrhea.

Etiological agents responsible for infective diarrheas include microorganisms like Bacteria, Viruses, Fungi and Parasites. Our study was aimed at isolating and identifying the Bacterial agents involved in causing acute and chronic diarrheas in children attending Department of Paediatrics, Government General Hospital, Guntur, Andhra Pradesh.

Materials and Methods

One hundred stool samples were collected from children below 12 years suffering with Acute and Chronic Diarrhea and Gastroenteritis from both out-patients and In-patients of Paediatric Unit, Government General Hospital, Guntur for the study.

Samples Collected from patients were processed in the Department of Microbiology for the isolation and identification of causative organisms. Fifty stool samples were collected from healthy children attending Government General Hospital for complaints other than diarrhea and Gastro enteritis as control group.

Collection of Specimens

The specimen was collected prior to the administration of antibiotics in a sterile container used in stool collection with a small plastic spoon attached to the inside of screw cap. The screw cap is removed and a single spoonful i.e., 5ml of stool collected directly into the container and the cap is replaced tightly. The stool sample is

collected in sterile condition without contamination with patient's urine. All the collected samples were processed in the Department of Microbiology, Guntur Medical College, Guntur within one hour of collection. A loopful of collected stool sample is inoculated on Basal and Selective media and processed by Standard Microbiological Techniques and tested for Antibiotic Sensitivity for the isolate.

Results and Discussion

A total of one hundred stool samples were collected from children below 12 years suffering with diarrhea and gastroenteritis in clinical wards of Pediatrics, Government General Hospital, Guntur. A total of 50 stool samples were collected from the same age group of healthy children as control.

There were 64 male and 36 female children in the study group of 100. Of these, 91 were in 0-5 years age group, among which 60 were male and 31 female children and four male and 5 female children in 5-12 years (Table:I). In the present study, male children (64%) were most affected than female (36%) and studies by various authors, Surya kanta samal *et al.*, 2008, Vyas kumar Rathaur *et al.*, 2014(54.6% male, 45.4% female) and Sunil Kumar *et al.*, 2015 (59% male and 41% female) reported male preponderance.

Cases from Rural area were 64 and Urban were 36(Table II) in the study group which is in accordance with studies by Vyas Kumar Rathaur *et al.* (2015) reporting an incidence of 57.5% in rural children and 42.5% in children living in urban set-up.

Among 100 cases, 88 belong to Low Socio-economic status and 12 to middle Socio-economic group and this correlates with studies by Seema Kumara *et al.* (2013)

reporting an incidence of 66.6% in Lower income group and 33.3% in middle income group and Manoj Kumar *et al.* observed the incidence to be 74.5% in Low income group followed by Middle income 21.5% and least in High income group 4%.

Among the 100 samples, *Escherichia coli* was isolated in 54(54%), *Klebsiella species* 17(17%), *Salmonella species* 1(1 %) and *Pseudomonas aeruginosa* 1(1 %). Incidence of mixed infection with *Escherichia coli* and *Klebsiella* was (6%), 12 (12%) were culture negative and in nine samples non-pathogenic organisms (9%) were isolated. Among the total of 54 *Escherichia coli* isolated, 48 were in the age group between

0-5 years (88.8%) and 6(11.1%) in 5-12years. In this study, the Predominant organism isolated in diarrheal cases (46%) and acute gastro enteritis (8%) were *Escherichia coli* (Table III & IV).

Escherichia coli was the predominant organism isolated in our study and this correlates with studies by various authors from different areas reporting that the frequently isolated organism is *Escherichia coli*. Surya Kanta Samal, *et al.* (2008) reported an isolation of 75.5% *Escherichia coli*, Haricharan K.R. *et al.* (2013) as 42.66% and Vyas Kumar, *et al.* (2014) as 44.2%. Other bacterial isolates were similarly reported by these authors.

Table.1 Age Wise and Sex Wise Incidence

Age	Sex		Total
	Male children	Female children	
0-5	60	31	91
5-12	4	5	9
	64	36	100

Table.2 Socio-Economic Status

Urban	36
Rural	64
Total	100

Table.3 Clinical Incidence Of Organisms Isolated

Names of Pathogenic organisms isolated	Diarrhea	Gastroenteritis	Total
<i>Escherichiac coli</i>	46	8	54
<i>Klebsiella species</i>	5	2	17
<i>Esch.coli and Klebsiella</i>	3	3	6
<i>Pseudomonas aeruginosa</i>	-	1	1
<i>Salmonella species</i>	1	-	1
Non Pathogenic organism	6	3	9
Culture negative	7	5	12
Total	68	32	100

Table.4 Age Wise and Sex Wise Incidence

Names of pathogenic organisms isolated	Male children	Female children	Total
Escherichia coli	30	24	54
Klebsiella species	10	7	17
Esch.coli and Klebsiella	4	2	6
Salmonella species	-	1	1
Pseudomonas aeruginosa	1	-	1
Non Pathogenic organism	4	5	9
Culture negative	8	4	12
Total	57	43	100

Table.5 Table Showing Sensitivity Pattern of the Isolated organisms

Names of the pathogenic organisms isolated	Names of the antibiotics				
	Furazolidine	Cotrimoxazole	Ciprofloxacin	Norfloxacin	Gentamicin
<i>Esch. coli</i>	Nil	Nil	54	54	54
<i>Klebsiella species</i>	Nil	Nil	17	17	17
<i>Esch.coli and Klebsiella sp</i>	Nil	Nil	6	6	6
<i>Salmonella species</i>	Nil	Nil	1	1	Nil
<i>Pseudomonas aeruginosa</i>	Nil	Nil	1	Nil	Nil

Table.6 Case Follow Up

	Diarrhoea	Gastroenteritis	Total
Recovery	69	26	95
Mortality	4	1	5
Total	73	27	100

Antibiotic sensitivity pattern in the study reveals that *Escherichia coli* responded predominantly to Ciprofloxacin, Norfloxacin and Gentamicin, *Klebsiella* to Ciprofloxacin, Norfloxacin and Gentamicin, *Salmonella* to Ciprofloxacin, Norfloxacin and *Pseudomonas aeruginosa* to Ciprofloxacin. All isolates of *Escherichia coli* are resistant to Furazolidine and Co –trimoxazole, *salmonella* to Furazolidine and Co-trimoxazole and *Pseudomonas* to Furozolidine and Co-trimoxazole (Table V).

Studies reported by Mamatha Ballal *et al.* in India have shown a similar pattern of

antibiotic sensitivity of *Escherichia coli* to Ciprofloxacin, Gentamicin and Norfloxacin.

Follow-up study of the cases revealed that the total deaths were 5%, among which 4% were due to diarrhea and 1% due to acute gastro-enteritis (Table VI). Analysis of Diarrheal deaths by Dutta *et al.* reported an incidence of 17.1% and our study has a lower rate.

Among fifty control group *Escherichia coli* was isolated in 24 cases, *Klebsiella* in 6 cases in the age group of 5-12years and no bacterial isolates among 0-5 age group. The

normal colon strains belong to the early 'O' groups 1, 2, 3, 4 etc. while the Enteropathogenic stains belong to the late 'O' groups 26, 55, 86, 111 etc., and this may account for *Escherichia coli* isolated in 24 cases of diarrhoea in 5-12years. *Klebsiella* species may occur as commensal in the intestine and may turn pathogenic in 0-5years age group by colonization.

In conclusion, from this study it can be concluded that the predominant isolate in pediatric diarrheas is *Escherichia coli* and its sensitivity pattern revealed that it is susceptible to Ciprofloxacin, Norfloxacin and Gentamycin. In view of this observation in this study the pediatricians can take the advantage to start the treatment with one of the above antibiotics at the earliest for the treatment of cases with diarrheas and acute gastro-enteritis.

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