

Characteristics of stool in rotavirus and non rotavirus diarrhea cases: A comparative study

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Abstract

Background: Diarrhea is a leading cause of child mortality worldwide. Rotavirus is one of the most common causes of severe diarrhea and dehydration in children. Naked eye examination of stool for the presence of abnormal color, foul smelling, visible mucus has been performed for decades to assess the cause. An attempt has been made to compare the usefulness of direct stool examination in making a diagnosis in patients with rotavirus and non rotavirus diarrhea. **Material and Methods:** Two hundred stool samples from hospitalized children less than 5 years of age with symptoms of acute gastroenteritis were included. On day of receiving stool specimen its macroscopic examination was done as per standard protocol and characters were recorded. **Results:** 54% of rotavirus cases showed green stool color which was significantly more as compared to other stool colors. Significantly higher percent foul smelling stool (80.6%) and with mucous flakes (83.6%) were rotavirus positive. **Discussion:** A simple naked eye stool examination is helpful in establishing a preliminary diagnosis of rotavirus diarrhea and non rotavirus diarrhea and it can prevent unnecessary use of antibiotics.

Key Words: Stool examination, rotavirus diarrhea, non rotavirus diarrhea, diagnosis.

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INTRODUCTION

Acute diarrhea remains a major public health problem in the world. It is estimated to cause 1.5 million deaths and 21% of all under fives mortality worldwide¹ and accounts for about five childhood deaths per 1000 population² mostly from developing countries. Many different agents can cause acute diarrhea such as viruses, bacteria and parasites. Rotavirus is a leading cause of infantile gastroenteritis worldwide and is responsible for approximately 20% of diarrhea-associated deaths in children under 5 years of age³. More sophisticated laboratory setup is required for precise identification of

these aetiological agents. These agents can be identified by culture techniques, viral cultures or molecular studies. The economic and technical limitations in most developing countries such as India make such studies difficult. Although an aetiological diagnosis should not influence the decision to give oral rehydration treatment, it may influence the decision to prescribe with held antibiotics. Naked eye examination of stool for the presence of abnormal color, foul smelling, visible mucus and microscopical examination for fat globules, red and white blood cells, and parasites have been performed for decades to assess colonic inflammatory processes and malabsorption of fat and carbohydrate. Because of recent recognition of the importance of diarrhea caused by rotavirus in children, an attempt has been made to compare the usefulness of direct naked eyes tool examination in making a diagnosis in patients with rotavirus and non rotavirus diarrhea.

MATERIAL AND METHODS

This prospective study was conducted over a period of one year in a Department of Microbiology at a tertiary care hospital. Two hundred stool samples from hospitalized children less than 5 years of age with

symptoms of acute gastroenteritis were included after obtaining approval from the institutional ethics committee. Children above five years of age, outdoor patients and not giving consent were excluded from study. Consent was taken from the guardian of child for participation in the study after explaining the protocol to the guardian in the language that the guardian best understood. A detailed history including the demographic profile, presenting complaints, past history and risk factor was elicited for each patient and duly recorded in the case record forms. Freshly passed 3 to 5 ml of stool samples were collected in a dry, sterile, wide mouth container from hospitalized children with acute gastroenteritis by the help of their guardian and transported to Microbiology laboratory immediately. On day of receiving stool specimen its macroscopic examination was done as per standard protocol and characters such as color, consistency, odour, mucous flakes, blood, stones or crystals, worm or its segments were recorded. Then the stool was divided in three parts. One part was processed for microscopic examination and culture. Second part was

used for rapid test to detect rotavirus antigen from stool specimen. Third part was stored at -20°C to perform rotavirus antigen Enzyme linked immunosorbent assay [ELISA] subsequently.

RESULTS

Maximum cases of acute gastroenteritis belonged to age group 6 months to 2 years (53.5%) followed by more than 1 month to six months of age (27.5%). Out of 200 patients, 61.5% were male and 38.5% were female with male: female ratio of 1.6:1. These differences in distribution of cases in different age groups and sex were found to be statistically insignificant. A total of 56 cases were diagnosed as rotavirus cases and remaining 144 cases as non rotavirus cases. 54% of rotavirus cases showed green stool color which was significantly more as compared to all other stool colors. Also only 1% non rotavirus cases showed green stool color which was significantly less as compared to all other stool colors.

Table 1: Association between stool color and rotavirus cases

Stool color	Rotavirus cases (n=56)		Non rotavirus cases (n=144)		Total (n=200)	
	No.	%	No.	%	No.	%
Brown	4	7.14	24	16.67	28	14
Clear	6	10.71	38	26.38	44	22
Cream	8	14.29	31	21.53	39	19.5
Green	30	53.57	2	1.39	32	16
Yellow	8	14.29	49	34.03	57	28.5

Chi square value: 82.3; P value: <0.01*

Table 2: Association between foul smelling stool and rotavirus cases (n=200)

Foul smelling	Rotavirus cases (n=56)		Non rotavirus cases (n=144)		Total (n=200)	
	No.	%	No.	%	No.	%
Yes	50	80.6	12	19.4	62	100
No	6	4.3	132	95.7	138	100

Chi square value: 124; P value: <0.01*

Significantly higher percent foul smelling stool (80.6%) were rotavirus positive. Significantly higher percent stool samples with mucous flakes (83.6%) were rotavirus positive.

Table 3: Association between mucus flakes in stool and rotavirus cases (n=200)

Mucus flakes	Rotavirus cases (n=56)		Non rotavirus cases (n=144)		Total (n=200)	
	No.	%	No.	%	No.	%
Yes	51	83.6	10	16.4	61	100
No	5	3.6	134	96.4	139	100

DISCUSSION

In present study, among rotavirus cases 62.5% of cases were male and 37.5% of cases were female. Male to female ratio were 1.7:1.0. But this difference in male and female distribution was found to be statistically in

significant. Maximum cases of acute gastroenteritis in present study belongs to age group 6 months to 2 years (53.5%) followed by age group 1 month to 6 months of age (27.5%). In all age groups of patients who presented with acute gastroenteritis, males were more than female.

In one study done by Satarupa Mullick *et al*⁴ in 2014 maximum cases of acute gastroenteritis belonged to 6 months to 2 years followed by 0–6 months of age. In another study done by Shaveta Dhiman *et al*⁵ in 2015 at Amritsar maximum cases of acute gastroenteritis belonged to 6 months to 2 years of age (69%). These findings were similar to present study. In present study 54% of rotavirus cases showed green color watery stool while among non rotavirus case only 1% had green watery color stool, hence there could be association between green color watery stool and positivity for rotavirus (Table 1). However, on literature search similar finding was not observed. Among rotavirus cases 80.6% patients had peculiar foul smell from their stool specimen. While among non rotavirus cases only 19.6% patients had foul smelling stool specimen. Hence there could be association between peculiar foul smell from stool and positivity for rotavirus (Table 2). In study conducted by J Poulton and M J Tarlow⁶ it was observed that 38% of the stools containing rotavirus were correctly identified only by its peculiar foul smell. It is not clear what causes the distinctive smell. It might be due to disruption of normal gut function, or a change in the normal gut flora. Damage to the brush border reduces disaccharide concentration and endopeptidases are probably also affected in this way. Disaccharides and peptides may, therefore, be present in the stools in increased concentrations. Derivatives, such as lactic acid, are volatile and pungent, and could affect the smell of the stools^{7,8}. Any change in the composition of colonic fluid will unbalance the normal flora which carry out many metabolic processes. Such change could affect the relative concentrations of pungent products, including short chain fatty acids and indoles, thereby altering the smell. In present study among rotavirus cases 83.6% had mucous flakes in their stool specimen while among non rotavirus cases only 16.4% patients had mucous flakes in their stool sample. There could be association between presence of mucous flakes in stool specimen and positivity for rotavirus (Table 3). In study done by Borade A *et al*⁹ in 2012 at Pune mucous flakes

were present in 53.4% cases of rotavirus diarrhea. This can be because of malabsorption from gut and inflammation of epithelial lining of intestine in rotavirus diarrhea. In conclusion, a simple stool examination is helpful in establishing a preliminary diagnosis of rotavirus diarrhea and non rotavirus diarrhea. It has value in children for which drug treatment may be indicated. Although stool examinations were of limited usefulness in discriminating between pathogens in watery diarrhea, it guides us in treating the children with only rehydration treatment withholding the unnecessary antibiotics and other drugs.

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