Original Article

Efficacy of Single Dose Intravenous Ondansetron vs Metoclopramide in Children with Acute Gastroenteritis with Vomiting

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ABSTRACT

Objective: To compare the efficacy of ondansetron and metoclopramide in children with gastroenteritis with vomiting.

Study Design: cross-sectional study

Place and Duration of Study: This study was conducted at the Pediatric Unit, Lady Reading Hospital Peshawar from May, 2019 to November, 2019.

Materials and Methods: A total of 112 cases were enrolled and two groups made**.** Children in group A were treated with rehydration therapy and metoclopramide for vomiting whereas children in group B were treated with rehydration therapy plus ondansetron. Patients were monitored for vomiting at one and 06 hours of administration of antiemetic drugs.

Results: Of the total 112 cases, 66 (58.9 %) were male, 46 (41.1 %) were female patients. Mean age was 3.45 ± 1.70 years. Mean BMI was 22.32 ± 1.13 kg/m^2 while 15 (13.4 %) of cases were obese. History of breastfeeding was noted in 73 (65.2%). Mean duration of illness was 4.24 ± 2.15 days, 106(64.6%) had a total duration of 7 days. Of total cases 81 (72.3 %) were vaccinated, 31 (27.7 %) unvaccinated. Out of 112 cases, 100 responded well to treatment, in Group A the efficacy was 46 (82.1%) whereas in group B it was 54 (96.4%)

Conclusion: Ondansetron was found to be safe, efficacious, for treating children with acute gastroenteritis with vomiting. And having a higher efficacy than metoclopramide, hence it is concluded that ondansetron can be safely given to children with acute gastroenteritis with vomiting

Key Words: Acute gastroenteritis, Efficacy, Ondansetron

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INTRODUCTION

Acute gastroenteritis contributes to a majority of pediatric emergency visits and contributes significantly to morbidity and mortality worldwide [1]. According to an estimate by WHO and UNICEF around 2.5 billion episodes of diarrheal illnesses occurs in under 5 children each year with a mortality of 1.5 million children globally.[2, 3] It was estimated that aorounf 3.6 diarrheal episodes occur per child in a year , that accounts for 13% of all childhood DALYs[1].

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In our country, Pakistan, on average every child suffers from 5 to 6 episodes of diarrhea per year and about 500 children die daily.[2, 4] According to the PDHS 2012-13, Khyber Pakhtunkhwa has the highest prevalence of acute gastroenteritis under five years of age 28%, followed by Sindh 23% and Punjab 22% and is lowest in Baluchistan 12%.[4]

Vomiting is usually seen and is very bothersome symptom in children presenting with gastroenteritis, but physician's opinion regarding its treatment varies[5]**.** However, in the routine healthcare setups antiemetic medicines are commonly prescribed in pediatric population with gastroenteritis. Antiemetics are commonly prescribed to patients with acute gastroenteritis by physicians, around 2 to 23% of children were treated with antiemetics with a rationale that vomiting may limit the use of oral rehydration therapy.[5, 7].

In acute gastroenteritis persistent vomiting is a very common cause of admission in hospitals, cessation of vomiting in these children can help in lowering the frequency of hospital admissions hence leading to

successful ORT that is a better practice for rehydrating the children and is also preferred by WHO [8].

Apart from clinical uses, treatment of children with gastroenteritis as outpatients in homes is proved to have socioeconomic benefits for both family as well as community, owing to not admitting the patient in hospital. High hospital bills, difficulty in caring for parents if employed are also a burden for the hospital as it results in more occupation of hospital, decrease in nursing staff and lesser hospital tools. These are a few of issues faced because of higher frequency of hospital admissions for patients with diarrhea and vomiting.[9] Implication of pharmacological intervention for consistent nausea and vomiting can ward off life threatening complications which may occur as a result of dehydration.[5,6,8] pharmacological agents used for this purpose are; bromopride, promethazine, dimenhydramine, domperidone, metoclopramide and ondansetron. Their acceptance is limited because of unsatisfactory efficacy (bromopride, domperidone) or side effects (promethazine, dimenhydramine, metoclopramide**)** [6,8,10].

In our institution metoclopramide and diphenhydramine are used for vomiting in children. As discussed earlier there is always the risk of its side effects and parent's anxiety. An anti-emetic which is safe and efficacious will offer the best option for this purpose. Ondansetron has been widely used for vomiting related to chemotherapy, radiation therapy and surgical procedures and is found safe and efficacious. However its routine use in acute gastroenteritis in children is not recommended. Studies have been performed and shown its efficacy in acute gastroenteritis in children[5, 6, 7, and 8]. Epifanio M et al[10] in their study found that ondansetron was effective in stopping vomiting in 100% at 01 hour and 98.3% at six hours of treatment compared to metoclopramide which was successful only in 94.8% at one hour and 84.4% at six hours in children with acute gastroenteritis with vomiting. Similar studies performed on efficacy of ondansetron showed results with efficacy in 81.1% of patients in Al-Ansari K et al study[11], 84% in Marzuillo P et al study[12] and 91% Mahram M et al study[9].

As persistent vomiting is the most common reason for admission in children presenting with acute gastroenteritis, so a secure and productive drug will be very beneficial in early discharge from emergency department and will decrease the admission burden and use of health facility use. This research is designed to determine the efficacy of ondansetron with comparison to metoclopramide in stopping vomiting, and if found superior to metoclopramide, then its results will be shared with other local pediatricians, pediatric emergency department consultants and hospital administration for its routine use which will decrease admission burden, a major problem in our clinical settings.

MATERIALS AND METHODS

It was Descriptive cross-sectional study conducted at Department of Pediatrics, Lady Reading Hospital Peshawar from 05-05-2019 to 05-11-2019. A total 112 (56 in each group) patients of both gender, Children with acute gastroenteritis with vomiting Age 01 to 15 years were included for the study. An informed consent was taken from their parents or relatives after explaining the importance, risks and benefits of the study and treatment guidelines. The exclusion criteria was Children with acute bloody diarrhea, Children with persistent diarrhea (more than 02 weeks), Children with functional disorder like cyclical vomiting syndrome, abdominal migraine diagnosed on history and clinical examination, Children with systemic illness (diagnosed on history, examination and laboratory tests), Children with vomiting due to other cause like acute hepatitis, pancreatitis, intestinal obstruction, meningitis etc. diagnosed on history, examination and laboratory work up. The above mentioned conditions act as confounders and if included will introduce bias in the study results.

Detailed history of present complaints, disease duration, signs and symptoms, previous medication, systemic review, feed if taken and vomiting. Important data of every child was recorded. Physical examination of every child was done and was looked for signs of dehydration. All children were randomly allocated in to two groups by lottery method. children with group A were given current recommended standard therapy for hydration and metoclopramide (by slow intravenous injection at a dose of 0.2 mg/kg/stat dose over 3 minutes with dilution of 0.5 mg/ml of normal saline) and group B was given standard rehydration therapy plus ondansetron (by slow intravenous injection at a dose of 0.2 mg/kg/stat dose over 3 minutes with dilution up to 0.5 mg/ml of normal saline) as antiemetic in place of metoclopramide. Patients were monitored for vomiting at one and 06 hours of administration of antiemetic drugs. The above mentioned information was recorded in a pre-designed proforma following the strictly exclusion criteria to control the confounders and bias in results.

SPSS version 20 was used for data analysis. Mean $\pm$ SD was calculated for numerical variables like age of the child, weight, duration of diarrhea, frequency of vomiting and stools at arrival. Frequency and percentages was calculated for categorical variables like gender, breast feeding, vaccination and efficacy (vomiting settled).

Chi square test used to compare the efficacy of both groups, keeping p value <0.05 as significant. Effect modifiers like gender, age, weight, breastfeeding and vaccination were controlled by stratification to see their effect on efficacy in both groups. After stratification chi – square test applied keeping the level of significance ($p \leq 0.05$).

RESULTS

A total of 112 participants were enrolled strictly following the inclusion criteria, out of these cases male patients were 66(58.9%) whereas female was 46(41.1%). The mean age was 3.45 ± 1.70 years however the minimum age of the participants was 1 years while the maximum age was 8 years. Of the male participants the mean age was noted to be 3.27 ± 1.47 years whereas the mean age of female participants was 3.70 ± 1.98 years (p=0.199). major portion of our cases i.e., 102 (91.1 %) were aged upto 5 years.

Patients that belong to rural areas constitute 50 (44.6 %) of the total patients whereas those belonged to urban areas constitute 62 (55.4 %). Patients belong to Poor socioeconomic status was 66 (58.9%) and 46 (41.1%) were from middle income families. Mean BMI of the participants was 22.32 ± 1.13 kg/m^2 and obesity was present in 15 (13.4 %) of all cases. Of these 112 study cases, history of breastfeeding was noted in 73 (65.2%) and mean disease duration was 4.24 ± 2.15 days and 106 (64.6%) had duration of illness up to 7 days. Of these 112 study cases, 81 (72.3 %) were vaccinated children and 31 (27.7 %) were unvaccinated. Efficacy was noted in 100 (89.3%), efficacy in group A was 46 (82.1%) and in group B efficacy was noted to be in 54 (96.4%) of our study cases and efficacy was stratified with regards to gender, age, residential status, socioeconomic status, obesity, disease duration, breastfeeding and vaccination status. (Table No. 1-9).

Table No.1: Distribution of study cases by Efficacy (n = 112)

Efficacy (n=112)	Group A		Group B	
	Frequency	%age	Frequency	%age
Yes n= 100 (89.3 %)	46	82.1	54	96.4
No n= 12 (10.7 %)	10	17.9	02	3.6
Total	56	100	56	100

* p = 0.029, which is statistically significant

Table No.2: Stratification of gender with regards to efficacy in both groups (n = 112)

Gender	Efficacy	Groups		P – value
		Group A	Group B	
Male (n=66)	Yes (n=34)	28	06	0.025
	No (n=32)	32	00	
Female (n=46)	Yes (n=22)	18	04	0.405
	No (n=24)	22	02	

Table No.3: Stratification of age with regards to efficacy in both groups (n = 112)

Age	Efficacy	Groups		P – value
		Group A	Group B	
Up to 5 Years (n=102)	Yes (n=92)	42	50	0.049
	No (n=10)	08	02	
More than 5 Years (n=10)	Yes(n=08)	04	04	0.467
	No (n=02)	02	00	

Table No.4: Stratification of residential status with regards to efficacy in both groups (n=112)

Residential status	Efficacy	Groups		P – value
		Group A	Group B	
Rural (n=50)	Yes (n=44)	18	26	0.008
	No (n=06)	06	00	
Urban (n=62)	Yes (n=56)	28	28	0.672
	No (n=06)	04	02	

Table No.5: Stratification of socioeconomic status with regards to efficacy in both groups (n=112)

Socioeconomic status	Efficacy	Groups		P – value
		Group A	Group B	
Poor (n=66)	Yes (n=56)	26	30	0.084
	No (n=10)	08	02	
Middle Income (n=46)	Yes (n=44)	20	24	0.223
	No (n=02)	02	00	

Table No.6: Stratification of obesity with regards to efficacy in both groups (n=112)

Obesity	**Efficacy**	**Groups**		**P – value**
		Group A	**Group B**	
Yes (n=15)	Yes (n=13)	06	07	0.467
	No (n=02)	02	00	
No (n=97)	Yes (n=87)	40	47	0.051
	No (n=10)	08	02	

Table No.7: Stratification of disease breastfeeding with regards to efficacy in both groups (n = 112)

Breast-feeding	Efficacy	Groups		P – value
		Group A	Group B	
Yes (n=73)	Yes (n=61)	28	33	0.026
	No (n=12)	10	02	
No (n=39)	Yes (n=39)	18	21	NA
	No (n=)	00	00	

Table No.8: Stratification of disease duration with regards to efficacy in both groups (n=112)

Disease duration	Efficacy	Groups		P – value
		Group A	Group B	
Up to 7 days (n=106)	Yes (n=96)	44	52	0.050
	No (n=10)	08	02	
More than 7 days (n=06)	Yes (n=04)	02	02	0.467
	No (n=02)	02	00	

Table No.9: Stratification of vaccination with regards to efficacy in both groups (n=112)

Vaccination	Efficacy	Groups		P – value
		Group A	Group B	
Yes \(n=81)	Yes (n=72)	34	38	0.030
	No (n=09)	08	01	
No (n=31)	Yes (n=28)	12	16	0.576
	No (n=03)	02	01	

DISCUSSION

Sustainable Development Goals SDG 3.2 aim to reduce the rate of preventable deaths in children[13]

Acute gastroenteritis is a major cause of morbidity and mortality in children, various risk factors increases the likelihood of acute gastroenteritis, such as age, gender, geographic location, drinking unhygienic water, uncooked food, and family socioeconomic status.[14]

Mainstay of therapy in acute gastroenteritis remains correction of fluids and electrolytes imbalance

According to WHO, oral rehydration solution ORS is the preferred choice of therapy. Severe dehydration may lead to electrolyte imbalance including sodium, potassium, bicarbonate etc. that needs meticulous care and early intervention, if left untreated can results in serious manifestations.[15.]

The research comprised of 112 patients. 66 (58.9 %) out of 112 patients were male and 46 (41.1 %) were females. Research carried out by Moyo et al [15] shows 61.4 % male preponderance consistent with our study. Bilal et al [16] has male gender predominance with 61.3%.

The mean age of participants was 3.45 ± 1.7 years, mean age of male participants was 3.27 ±1.47 years, for females it was 3.70 ± 1.98 years (p 0.199). 102(91.1%) of the cases were aged up to 5 years. Moyo et al [15] found the similar results in his study. Bilal et al [16] in his study stated that mean age of children was 1.9 ± 1.4 years having acute gastroenteritis. Ijaz et al [17] stated 2.18 years mean age of participants, consistent with our findings.

50 (44.6 %) belongs to rural areas and 62 (55.4 %) from urban. Low socioeconomic conditions were noted in 66 (58.9%) and 46 (41.1%) were from middle income household. Mean BMI was 22.32 ± 1.13 kg/m^2 and 15 (13.4 %) were labeled obese. History of breastfeeding was noted in 73 (65.2%) and mean duration of illness was 4.24 ± 2.15 days with 106 (64.6%) had a total span of 7 days. Bilal et al [16] has also demonstrated mean duration of pediatric acute diarrhea was 3.2 ± 1.7 days. Another research carried out by Mukhtar et al [18] has also documented mean duration of pediatric acute diarrhea to be 5.13 ± 3.91 days, consistent with our findings.

81 (72.3 %) were vaccinated children and 31 (27.7 %) were un-vaccinated. Efficacy was noted in 100 (89.3%), efficacy in group A was 46 (82.1%) and in group B efficacy was noted to be in 54 (96.4%) of our study cases. Epifanio et al[10] in their study found that ondansetron was effective in stopping vomiting in 100% at 01 hour and 98.3% at six hours of treatment compared to metoclopramide which was successful only in 94.8% at one hour and 84.4% at six hours in children with acute gastroenteritis with vomiting. These findings are consistent with our results. Similar studies performed on efficacy of ondansetron showed results with efficacy in 81.1% of patients in Al-Ansari K et al study[11], 84% in Marzuillo P et al study[12] and 91% Mahram M et al study[9]. These findings are in accordance with our research findings. A study conducted in Rawalpindi by Amin et al [19] demonstrated similar results showing effectiveness of ondansetron in improving hydration among children with diarrhea.

CONCLUSION

Ondansetron was found to be safe, efficacious, reliable and effective for prevention of vomiting in children with acute gastroenteritis than that of metoclopramide. Efficacy of ondansetron was significantly higher as compared to metoclopramide, hence all clinicians treating such patients should always employ ondansetron to achieve desired clinical outcomes. This

will decrease burden of related morbidities, extra healthcare costs and improve quality of life of these patients.

Author's Contribution:

Concept & Design of Study:	Afzal Khan
Drafting:	Quratulain, Hina Pervez
Data Analysis:	Sohail Akhtar, Inayatullah, Fareed Ullah Shah
Revisiting Critically:	Afzal Khan, Quratulain
Final Approval of version:	Afzal Khan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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