Original Article
Pak Armed Forces Med J 2018; 68 (4): 1003-06

# ROLE OF ORAL ONDANSETRON AS AN ADJUCNT TO ORAL REHYDRATION THERAPY IN ACUTE GASTROENTERITIS

**Mehwish Amin, Muhammad Waqar Aslam Khan**

Army Medical College/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

## ABSTRACT

***Objective:*** To evaluate the role of oral ondansetron as an effective measure to facilitate oral rehydration in acute gastroenteritis.

***Study Design:*** Randomized controlled trail.

***Place and Duration of Study:*** Army medical college, Military hospital Rawalpindi, from Mar 2017 to Sep 2017.

***Material and Methods:*** One hundred and forty children with clinical diagnosis of acute gastroenteritis with mild to moderate dehydration were randomized into two equal groups. Group 1 was treated according to the WHO criteria with only ORS in a dose of 75ml/kg body weight. Group 2 received ondansetron before ORS as a single oral dose of 0.2mg/kg body weight.

***Results:*** The difference between improvement in drinking ability and hydration status between the two groups was highly significant ($p$<0.001).

***Conclusion:*** Ondansetron markedly improved the hydration status and drinking ability of the children by reducing nausea and vomiting.

**Keywords:** Acute gastroenteritis, Dehydration, Ondansetron.



## INTRODUCTION

Acute gastroenteritis is the leading cause of death in children under the age of five years[1]. World health organization recommends oral rehydration therapy (ORT) with ORS (oral rehydration salt) as the treatment of choice for children with mild to moderate dehydration. But it has been seen that this mild dehydration often gets converted into severe form requiring intravenous rehydration (IV) and hospital admission, which in turn increases the morbidity and mortality rate. One of the major reasons for this failure of oral rehydration is continuous vomiting[2]. So the aim of the study was to add an agent to ORT which reduces vomiting and improves hydration status efficiently thus decreasing the need for IV rehydration, hospital admissions and the overall burden of the disease. Oral ondansetron was used in a dose of 0.2mg/kg body weight as a single dose before ORT. Ondansetron is a 5- hydroxy-tryptamine receptor antagonist which acts centrally to reduce vomiting.

**Correspondence: Dr Mehwish Amin,** House No 44, Street No 01, Sector-B, DHA Phase-I Rawalpindi Pakistan
*Email: mehwishlaeeq8@gmail.com*
*Received: 21 Mar 2018; revised received: 07 Aug 2018; accepted: 28 Aug 2018*

## MATERIAL AND METHODS

The study was carried out in children's complex of Military Hospital Rawalpindi after approval of study project from ethical committees of Army Medical College (CREAM) and the Military Hospital, Rawalpindi. One hundred and forty children were enrolled into the study after informed consent of the parents. These children were aged between two to five years with clinical diagnosis of acute gastroenteritis with mild to moderate dehydration made by the pediatrician after a brief history and clinical examination. Children with at least two episodes of vomiting in last six hours were included in the study. All the children fulfilling the inclusion criteria were randomized into two equal groups with seventy children in each group (n=70).

The first group received only ORS for rehydration at the rate of 75 milliliters per kilogram (ml/kg) body weight[3] in the first four hours with an additional 2ml/kg body weight after each episode of vomiting as per

WHO guidelines for treatment of acute gastro-enteritis with mild to moderate dehydration.

The second group received oral ondansetron in a dose of 0.2 mg/kg body weight as single dose[4] at the time of enrollment. After an interval of 30 minutes ORT was started as per WHO guidelines with ORS in dose of 75ml/kg body and continued for up to four hour.

Data was analyzed using SPSS version 21. Descriptive statistics were used to describe the data. Mean and standard error of mean (S.E.M) were used to describe quantitative variables. Chi-square test was used to compare qualitative variables between the groups. A *p*-value<0.05 was considered as significant.

**Table-I: Comparison of frequency of vomiting between the groups.**

| Study Groups | Episodes of vomiting after treatment | | | | | | | Significance |
|---|---|---|---|---|---|---|---|---|
| | None 0 | Very mild 1-2 | Mild 3 | Moderate 4 | Severe 5 | Very severe 6 | Total | *p*-value |
| Group 1 | 3 | 3 | 14 | 27 | 22 | 1 | 70 | 0.001 |
| Group 2 | 26 | 29 | 15 | 0 | 0 | 0 | 70 | 0.001 |

**Table-II: Comparison of improvement in drinking ability and hydration status between the groups.**

| Study Groups | Improvement in drinking ability and hydration status after treatment | | | | | | | Significance |
|---|---|---|---|---|---|---|---|---|
| | None | Very mild | Mild | Moderate | Significant | Very significant | Total | *p*-value |
| Group 1 | 0 | 13 | 39 | 13 | 5 | 0 | 70 | 0.001 |
| Group 2 | 0 | 1 | 15 | 40 | 13 | 1 | 70 | 0.001 |

## RESULTS

In group-1, out of 70 children, 3 children had no episode of vomiting after the treatment. Three children had 1-2 episodes, 14 had 3 episodes, 27 had 4 episodes, 22 had 5 and 1 had 6 episodes of vomiting after treatment (table-I & fig-10.

In group-2, out of 70 children, 26 children had no episode of vomiting after treatment. Twenty nine had 1-2 episodes, 15 had 3 episodes, and no child showed more than 3 episodes of vomiting after treatment.

The difference in frequency of vomiting between the three groups was highly significant (*p*<0.001).

In group-1, all the children showed improvement in drinking ability and hydration status after the treatment. Thirteen children had very mild (were able to take 200ml of fluid in first four hours), 39 had mild (were able to take 400ml of fluid after four hours), 13 had moderate (were able to take 600ml of fluid after four hours), 5 had significant (were able to take 800ml fluid in first four hours) but no one showed very significant improvement after treatment (table-II, fig-2).

In group-2, all the children showed improvement in drinking ability and hydration status after treatment. One child had very mild, 15 children had mild, 40 had moderate, 13 had significant and 1 child showed very significant (was able to take more than 800ml of fluid in first four hours) improvement after treatment.

The difference in improvement in drinking ability and hydration status between the groups was highly significant (*p*<0.001).

## DISCUSSION

Diarrhea is the second leading cause of death in children under the age of five years and kills around 760,000 children per year in this pediatric age group[8]. Children that die from diarrhea actually succumb to death from dehydration and fluid loss. Acute gastroenteritis is a major cause of emergency department visits and hospitalization in developed and under developed countries[6]. Despite the overwhelming evidence to support the usage of oral rehydration, oral rehydration salt solution (ORS) is still described as an underused simple therapy[9]. Approximately 70 percent of all children with acute gastroenteritis present with vomiting and it is considered as a major barrier to successful

rehydration[5]. It frustrates both parents and care providers and prompts the use of unnecessary intravenous (IV) rehydration and hospital admission[7].

The use of an antiemetic for vomiting in acute gastroenteritis in children is still a matter of debate. In our study we have observed that vomiting is indeed a very crucial factor that determines the outcome of oral rehydration therapy.

In our study we found a statistically significant difference among the two groups. Children with acute gastroenteritis who were given ondansetron in an oral single dose of 0.2mg/kg before ORS (group-2) showed a marked reduction in vomiting which enhanced the intake of ORS thereby correcting dehydration efficiently in contrast to the group that received only ORS (group-1).

A randomized, prospective, double blind clinical trial comparing ondansetron with a placebo was carried out by Ramsook and his colleagues in 2002. They found that ondansetron was effective in reducing the emesis from gastroenteritis during the early phase of oral rehydration and in lowering the rates of intravenous fluid administration and hospital admission[12]. In 2016 Federico and his colleagues conducted a double blind randomized trial comparing the effect of an oral single dose of ondansetron to domperidone in reducing emesis related to acute gastroenteritis in children.

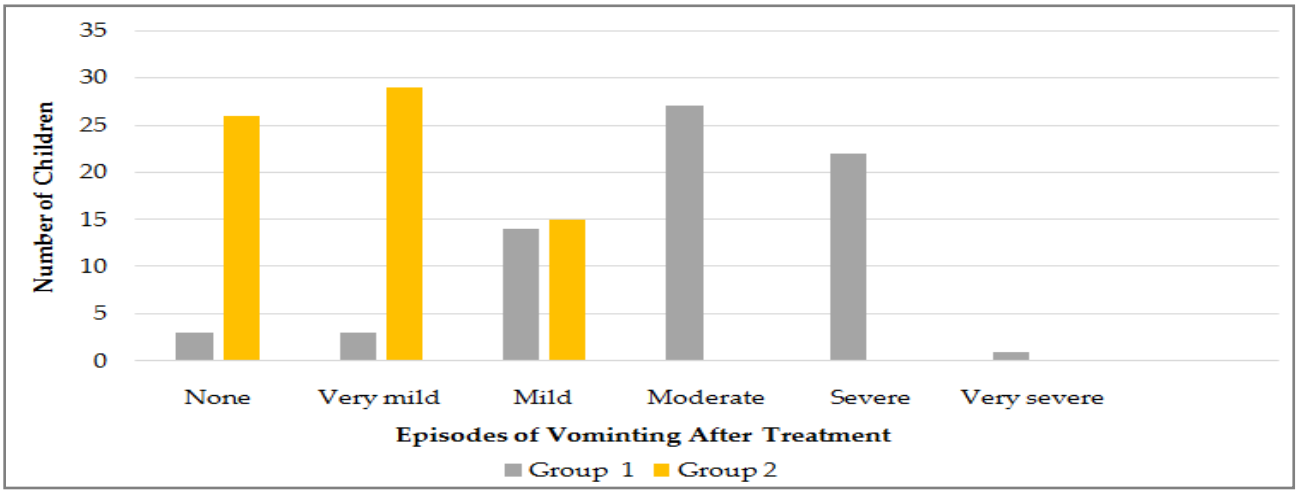


**Figure-1: Comparison of frequency of vomiting between the groups.**

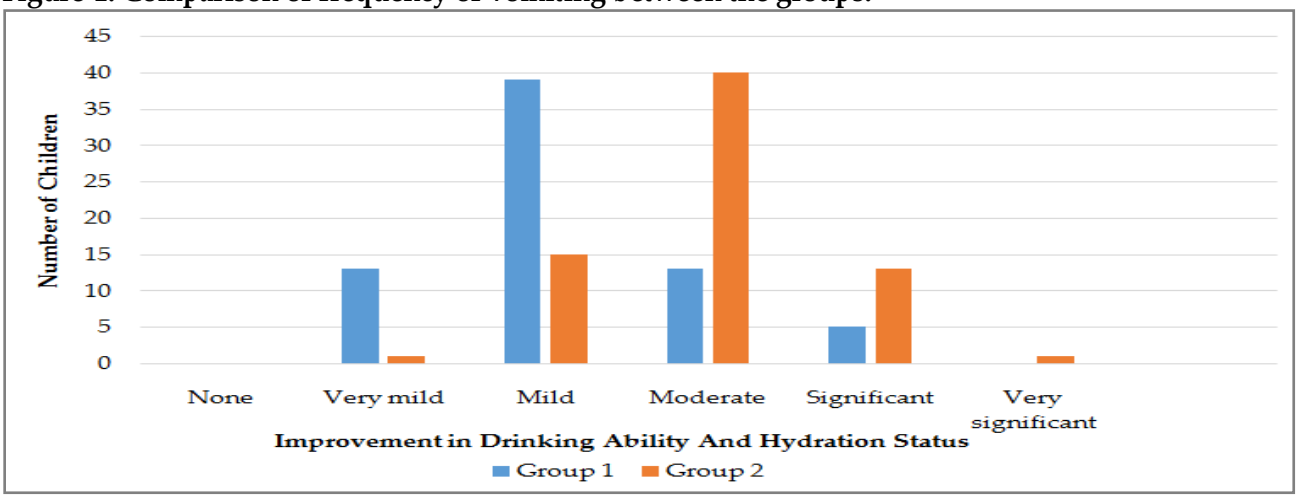


**Figure-2: Comparison of improvement in drinking ability and hydration status between the groups.**

Ondansetron reduced the risk of intravenous rehydration by over 50%, both vs placebo and domperidone[10]. In our study we observed that in group-1, only 3 children showed complete cessation of vomiting after 4 hours of treatment as compared to group-2, in which 26 children showed complete cessation of emesis. The difference between the two groups was statistically significant. One of the possible explanation could be that when taken orally, ondansetron is absorbed into the gastrointestinal tract[13] and being a serotonin 5-HT3 receptor antagonist, it functions by suppressing the vomiting centers in the brain and blocking afferent depolarization of vagal nerves peripherally in the intestines which provoke emesis response in acute gastroenteritis. By reducing emesis, ondansetron directly improves the oral intake of ORS thereby reducing the requirement of intravenous rehydration and hospital admissions[11].

## CONCLUSION

Although ORS is the mainstay of treatment in acute gastroenteritis with mild to moderate dehydration, still rehydration failure does occur in most of the patients. The main reason for this treatment failure is continuous vomiting which limits its oral intake. We have observed in our study that by adding ondansetron to the treatment regimen the outcome improves greatly. Ondansetron not only improves hydration status and drinking ability by decreasing vomiting but also reduces the chances of hospital admissions and IV rehydration. No noticeable side effect was observed after an oral single dose of 0.2mg/kg. It can be concluded from our study that ORT should be started as soon as possible in children with acute gastroenteritis but if the child fails to tolerate oral fluid due to excessive vomiting, ondansetron should be added to the treatment regimen to effectively improve the outcome. This simple measure can greatly decrease the disease burden by lowering the morbidity and mortality rate.

## CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

## REFERENCES


1. Whyte LA, Al-Araji RA, McLoughlin LM. Guidelines for the management of acute gastroenteritis in children in Europe. Arch Dis Childhood E 2015; 100(6): 308-12.
2. Fedorowicz Z, Jagannath VA, Carter B. Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents. Cochrane Database Syst Rev 2011; 9(9): CD005506.
3. Kariyappa M, Shepur T. Hyperglycemia, malnutrition, dehydrating gastroenteritis. Hyperglycemia in grade III and grade IV malnutrition with dehydrating gastroenteritis. Int J Evid Based Healthc 2015; 31(2): 4623-29.
4. Danewa AS, Shah D, Batra P, Bhattacharya SK, Gupta P. Oral ondansetron in management of dehydrating diarrhea with vomiting in children aged 3 months to 5 years: A randomized controlled trial. J pediatr 2016; 169: 105-9.
5. Fedorowicz Z, Jagannath VA, Carter B. Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents. Sao Paulo Med J 2012; 130(4): 270.
6. Geurts D, de Vos-Kerkhof E, Polinder S, Steyerberg E, van der Lei J, Moll H, et al. Implementation of clinical decision support in young children with acute gastroenteritis: A randomized controlled trial at the emergency department. Eur J pediatr 2017; 176(2): 173-81.
7. Gupta GR. Tackling pneumonia and diarrhoea: The deadliest diseases for the world's poorest children. Lancet 2012; 379(9832): 2123-4.
8. Lamberti LM, Ashraf S, Walker CL, Black RE. A systematic review of the effect of rotavirus vaccination on diarrhea outcomes among children younger than 5 years. Pediatr Infect Dis J 2016; 35(9): 992-8.
9. Gordon M, Akobeng A. Racecadotril for acute diarrhoea in children: Systematic review and meta-analyses. Arch dis child 2015: 309676.
10. Marchetti F, Bonati M, Maestro A, Zanon D, Rovere F, Arrighini A, et al. Oral ondansetron versus domperidone for acute gastroenteritis in pediatric emergency departments: Multicenter double blind randomized controlled trial. PloS one 2016; 11(11): e0165441.
11. Mathew JL, Kumar P, Deswal S. Placebo-controlled randomized trial evaluating efficacy of ondansetron in children with diarrhea and vomiting: Critical appraisal and updated meta-analysis. Indian J Pediatr 2016; 53(2): 149-53.
12. Ramsook C, Sahagun-Carreon I, Kozinetz CA, Moro-Sutherland D. A randomized clinical trial comparing oral ondansetron with placebo in children with vomiting from acute gastroenteritis. Ann Emerg Med 2002; 39(4): 397-403.
13. Xu M, Rieder M. A supplementary home dose of oral ondansetron given in anticipation of recurrent emesis in paediatric acute gastroenteritis. Paediatr child health 2014; 19(2): 107-8.