Change of serum calcium in patients with severe diarrhea

Done by:

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Introduction

The condition known as diarrhea is characterized by more frequent bowel movements—more than three per day—and changed stool consistency, or increased fluidity. Urgency, perianal soreness, incontinence, nausea, or a combination of these symptoms may be linked to it.Diarrhea can result from any illness that increases digestive secretions, reduces mucosal absorption, or modifies motility.(1)

There are three types of diarrhea: acute, persistent, and chronic. Persistent diarrhea usually lasts two to four weeks, whereas chronic diarrhea lasts longer than four weeks and may recur occasionally. Acute diarrhea is self-limiting, lasting one or two days. Viruses, such as norovirus, are often the cause of both acute and chronic diarrhea.

Moreover, certain medications, such as certain antibiotics (like erythromycin) and antacids that include magnesium (like magnesium hydroxide), might result in either acute or chronic diarrhea.(2)

More than ten loose, watery stools in a single day are indicative of severe diarrhea, which can cause dehydration. If left addressed, dehydration is a serious worry that may even be fatal. Severe dehydration can cause symptoms such as extreme thirst, decreased frequency of urination, dry lips and skin, extreme fatigue, and dizziness.(3)

Anal sphincter defects, Zollinger-Ellison syndrome, acquired immune deficiency syndrome (AIDS), anal sphincter defects, antiarrhythmic agents, antihypertensive agents, metabolic and endocrine disorders (e.g., diabetes, Addison disease, thyrotoxicosis), malabsorptive disorders (e.g., lactose intolerance, celiac disease), parasitic or Clostridium difficile infections are some of the causes of chronic diarrhea.(4)

Acute diarrhea management is still a problem in the world, especially in nations with little resources. The standard treatment is still oral

rehydration solution (ORS), a passive rehydrating therapy that was created around 40 years ago.(5)

ORS is useful for hydration, but it does not provide quick relief from diarrhea symptoms because it does not block the main causes of diarrhea, which are enterotoxin-mediated increased secretion, decreased absorption, and weakened barrier function.(6)

While there are a few alternative treatments, their usage is restricted due to their high cost, scarcity, and/or safety issues. There is a need for novel anti-diarrheal therapy techniques, especially those that are straightforward and inexpensive.(7)

Unlike others, targeting the antidiarrheal receptor system in this host seems to be "all-inclusive" because it inhibits secretory function, promotes absorption, inhibits motility, and reduces inflammation.(8) Thus, alterations in both secretory and inflammatory diarrheas are reversed by activating CaSR. It is possible that novel oral rehydrating solutions that are affordable and useful to use in all countries could be developed through targeting CaSR with a combination of specific

nutrients, given its unique property of using simple nutrients like calcium, polyamines, and certain amino acids/oligopeptides as activators.(9) Giving calcium supplements may help "halt" parasite and viral diarrhea. Calcium supplementation has been shown by Bovee-Oudenhoven et al. to lessen the intensity and length of Escherichia coli-caused bacterial diarrhea in adult human volunteers. (10)

Calcium may therefore act as a universal anti-diarrhea agent. In fact, individuals with hypercalcemia and those on high-calcium diets frequently have constipation.(11) Calcium therapy is reusable, and its anti-diarrheal impact may be repeated several times in the same patient without losing effectiveness or causing resistance to form; in fact, it may even make the patient more sensitive to the treatment. Despite its strange appearance, this is consistent with the known characteristics of the calcium-sensing receptor (CaSR), which is the main sensor of extracellular calcium.(12)

The CaSR is endowed with a unique intracellular mechanism that allows it to "refuse" agonist-induced receptor internalization, in contrast to the

majority of G protein-coupled cell surface receptors where previous drug exposure causes "desensitization."(13)

It is crucial to remember, though, that a quicker reaction to the second therapy might also be the result of the diarrhea being less than it was during the first treatment.(14)

Aims of the study

The purpose of research was to assess the changes of serum calcium in severe diarrhea at Baquba teaching hospital patients.

Methodology

Research design : A cross sectional study .

Research area : Baquba teaching hospital.

Research population : All patient with severe diarrhea .

Time of data collection : Clinical study was carried out from November 2023 to march 2024.

Sample size : A convenient sample of 26 patients with severe diarrhea.

Moral considerations : The research was approved by Council of the College of Medicine, Diyala University . Every patient enrolled in the trial gave verbal informed permission.

Inclusion criteria: Patients presenting with severe diarrhea.

Exclusion Criteria:

1. Pregnant women.

2. Age less than 15 years of age.

3. Psychatric patients.

4. Non cooperative patients.

5- Patient who have hypocalcaemia before diarrhea.

Tools for collecting data: The researcher used patient lab testing to get the data.

2.10 Statistical analysis

The data description was conducted using SPSS Version 26, a statistical tool for social science. Chi square was performed to determine the connection between the variables when a p value of less than 0.05 was deemed significant. The results were given as numbers and percentages.

Result

Data were collected from 26 patients as a sample with severe diarrhea we found 7 male and 6 female patients were controlled the calcium while 8 male and 5 female were uncontrolled their calcium as shown in table 1.

Table (1): Participants' age distribution

Age (years)	Controlled calcium		Uncontrolled calcium	
	Male	Female	Male	Female
20-30 years	1	2	2	1
31-40 years	2	1	1	0
41-50 years	1	0	1	3
51-60 years	3	3	4	2
Total	7	6	8	5

P value = 0.06 considered not significant (P value < 0.05 considered as statistically significant)

Table 2 show that the mean and standard deviation of controlled group were 11.09±1.8 whiles the mean and standard deviation of uncontrolled group 9.64±1.1.

Table (2) : Mean serum calcium level at both group

Serum calcium (mg|dl)	Mean ± SD (mg|dl)
Controlled group	11.09±1.8
Uncontrolled group	9.64±1.1

P value = 0.05 considered not significant (P value < 0.05 considered as statistically significant)

Discussion

Diarrhea can result from increased intracellular calcium ion concentrations because they can decrease the absorption of potassium and sodium ions, increase the secretion of chloride ions, and raise the intestinal lumen's electrolyte content. The link between extracellular calcium levels and diarrhea is still unclear, despite the fact that diarrhea is exacerbated by high intracellular calcium levels. Researchers have discovered a strong correlation between a greater blood calcium level and a worse chance of survival for colorectal cancer patients. It is yet unknown, nevertheless, if serum calcium has an impact on diarrhea.(15)

In our study we found there was not relationship between level of serum calcium and the age and this result agree with Zulqarnain et al .(16) which found that age not effect on the serum calcium in severe diarrhea. We also found there were no relationship between level of serum calcium and sex in severe diarrhea patients .

In this study we found the mean and standard deviation of controlled group were 11.09±1.8 while the mean and standard deviation of uncontrolled group 9.64±1.1 and this agree with LI et al.(17)

Conclusion

Serum calcium effected sometimes by the severe diarrhea and become uncontrolled, There no relationship between serum calcium and age , sex. Adequate measures of calcium should be taken for the prevention and control of severe diarrhea.

Recommendation

1-We recommended more study on effect of calcium in severe diarrhea.

2- Increase awareness about the calcium effect on severe diarrhea patients by making lectures and interview in TV and social media