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FREQUENCY OF HYPONATREMIA IN PATIENTS TAKING SODIUM PICOSULFATE SOLUTION (SPS) SOLUTION FOR BOWEL PREPARATION PRIOR TO COLONOSCOPY

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Abstract

Background: Colonoscopy is a helpful technique in modern medicine that is being used more often for both therapeutic and diagnostic objectives. Its diagnostic efficacy is dependent on the manner in which the procedure is performed.

Objective: The aim of the current study was to explore the Frequency of hyponatremia in patients taking Sodium Picosulfate Solution (SPS) solution for bowel preparation prior to colonoscopy.

Methodology: The current study was carried out in medicine department at Ghulam Mohammad mahar medical college hospital sukkur from March 2021 to April 2022 after taking approval from the ethical committee of the institute**.** PASS 11 software was used to compute the sample size using a two-sided Z-test S (P0) with a difference (PI-P0) = 0.24. Participants receiving colonoscopies between the ages of 16 to 60 years of both gender were included. On the day before the colonoscopy, at 12 PM, each individual received two doses of 45 milliliters of SPS diluted in 400 milliliters of water. Serum sodium levels < 135 mEq/L[7] were considered hyponatremia, whereas serum sodium levels > 145 mEq/L[8] were considered hypernatremia. The data was analyzed through SPSS software version 25.

Results; A total of 58 individuals who underwent colonoscopy were included. The individual's mean age ±standard deviation was 40.1 ±15.2 years. Out of which 30 (51.7%) were males and 28 (48.2%) were females. Prior to using the colonoscopy solution, the average sodium level were 139.7 ±3.5 mEq/L. Of them, 6(10.3%) had values below 135 mEq/L, meaning they had hyponatremia prior to taking SPS, while 2 person (3.4%), had hypernatremia. Following SPS, the average sodium level was 138.9 ±3.8 mEq/L. Following SPS, hyponatremia was observed in 7 (12.0%) individuals and hypernatremia in 3 (5.1%) patients. It was discovered that there was no statistically significant change in the mean blood sodium levels prior to and following SPS (t(53) = 1.308; a p-value of 0.196).

Conclusion: None of our individuals had any significant side effects. Patients having colonoscopy before using SPS bowel preparation fluid and their blood sodium levels prior to the procedure did not significantly differ from one another.

Keywords: Frequency; Hyponatremia; Sodium Picosulfate Solution; bowel preparation; colonoscopy

Introduction

Colonoscopy is a helpful technique in modern medicine that is being used more often for both therapeutic and diagnostic objectives. However, the standard of bowel cleaning has a significant impact on its efficacy.[1] it diagnostic efficacy is dependent on the manner in which the procedure is performed.[2] While insufficient bowel preparation can result in missed inadequate or flat lesions, major obstruction to the colonoscope's progression, decreased caecal intubation rates, and a greater need for sedatives and analgesics, optimal bowel preparation shortens the time needed for caecal intubation and increases the rate of polyp detection, which in turn increases the rate of adenoma detection.[3] Sodium phosphate, sodium picosulfate (SPS), and polyethylene glycol (PEG) are the most often employed solutions for colonoscopy preparation.[4] Preparing the bowel for a colonoscopy may result in electrolyte imbalances like hyponatremia, which can have major neurological effects including convulsions, unconsciousness, and finally coma.[5] SPS stimulates and laxities the colon, increasing the frequency and force of peristalsis, which results in diarrhoea.[6] Nonetheless, certain hyponatremia instances linked to its usage have been documented. Patients with risk factors, such as advanced age, usage in SSRIs and thiazide diuretics, chronic renal disease, congestive heart failure, or previous experiences of electrolyte abnormalities, are more likely to experience fluid and electrolyte imbalances.[1] Our goal was to find out the incidence of hyponatremia resulting from bowel preparation in order to raise awareness of this electrolyte imbalance among colonoscopists. As a result, patients having this operation will benefit from improved care and increased patient safety.

Methodology

The current study was carried out in medicine department at Ghulam Mohammad mahar medical college hospital sukkur from March 2021 to April 2022 after taking approval from the ethical committee of the institute**.** PASS 11 software was used to compute the sample size using a two-sided Z-test S(P0) with a difference (PI-P0) = 0.24. There is a 95% power of analysis and a 0.05 p-value. Participants receiving colonoscopies between the ages of 16 to 60 years of both gender were included. Individuals with hypothyroidism, diuretics used for whatever reason, individuals with chronic renal disease, and patients who overlooked the preparation instructions were also excluded. On the day before the colonoscopy, at 12 PM, each individual received two doses of 45 milliliters of SPS diluted in 400 milliliters of water. They were instructed to take two more 400 ml glasses of water throughout the course of the following hour. At 6:00 PM on the same day, a second dosage of SPS was administered in a comparable dilution and strength, and it was followed by a second drink of water. They were instructed to follow a liquid diet for 24 hours prior to the colonoscopy and to abstain from any food for four hours before to the procedure. A blood sample for electrolytes was obtained two times: thirty minutes before to the administration of SPS solution and thirty minutes prior to the colonoscopy. Serum sodium levels < 135 mEq/L[7] were considered hyponatremia, whereas serum sodium levels > 145 mEq/L[8] were considered hypernatremia.

Analysis of data

The data analysis software used was SPSS version 25. Age and salt levels were presented as mean ±SD. The student's t-test was used to compare the mean age with the gender. The difference between the sodium level in the blood before to consuming the colonoscopy solution and the serum sodium level prior to the colonoscopy was ascertained using a paired sample t-test. Serum Na+ values from before and after were recoded into additional variables based on a threshold of < 135 mEq/L, which indicated whether or not the subjects had hyponatremia. The frequency of hyponatremia was ascertained and compared using the χ 2 test before and after SPS. The difference between the Na+ levels before and after SPS was used to calculate the change in Na+ levels

(negative values indicated a drop in Na+ levels after SPS, and positive values an increase). A p-value of less than or equal to .05 was considered significant.

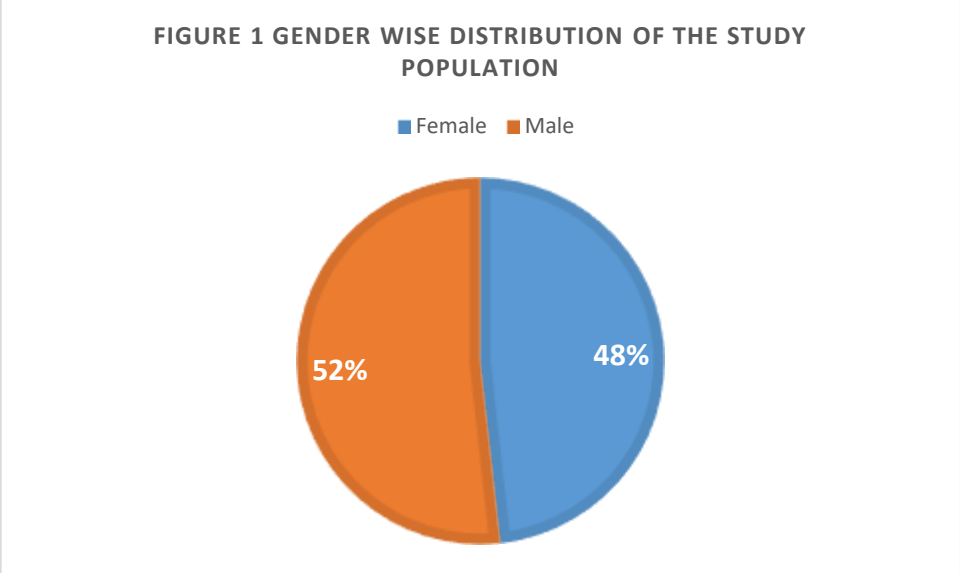
Results

A total of 58 individuals who underwent colonoscopy were included. The individual's mean age ±standard deviation was 40.1 ±15.2 years. Out of which 30 (51.7%) were males and 28 (48.2%) were females. (**Figure 1)** Males had an average age of 38.6 ±15.3 years, and females had an average age of 41.8 ±15.3 years. The gender-to-gender age difference was not statistically significant ((p = 0.452; df 52; 95% CI -11.5 to 5.2)

Prior to using the colonoscopy solution, the average sodium level were 139.7 ±3.5 mEq/L. Of them, 6(10.3%) had values below 135 mEq/L, meaning they had hyponatremia prior to taking SPS, while 2 person (3.4%), had hypernatremia. Following SPS, the average sodium level was 138.9 ±3.8 mEq/L. Following SPS, hyponatremia was observed in 7 (12.0%) individuals and hypernatremia in 3 (5.1%) patients. It was discovered that there was no statistically significant change in the mean blood sodium levels prior to and following SPS (t(53) = 1.308; a p-value of 0.196). Na+ levels rose in 16 (27.5%) patients from index value and declined in 35 (60%) participants from index value following SPS; no alteration in Na+ levels was seen in 6 (10.3%) following SPS solution**.(table 1)**

Table-I: Paired Sample Statistics of Serum Sodium prior and following Colonoscopy Solution.

	Mean	Standard Deviation	Standard Error of Mean	95% Confidence Interval	P value
Before Solution sodium	139.71	3.451	0.468	-0.415 to 1.970	0.196
After solution sodium	138.94	3.829	0.520		



Discussion

These days, colonoscopies are often used for both therapeutic and diagnostic objectives. It is the most widely used study for colorectal cancer screening, as millions of procedures are carried out worldwide each year.[9]

A well-prepared colon is a critical need for the effective conduct of a colonoscopy, as the efficacy of the bowel cleansing process plays a major role in determining the colonoscopy's speed, difficulty, and comprehensiveness.[10] Solutions for colonoscopy are frequently recommended to prepare the bowels. Numerous Solutions for colonoscopies are available. Case studies are available, indicating that intestinal preparation Colonoscopy solutions may result in electrolyte abnormalities. Potential for electrolyte abnormalities depending on the kind of solution used for bowel preparation utilized, the patient's age, and any comorbidities.[11] In our setting, SPS colonoscopy preparatory solution is frequently employed. SPS is a prodrug that is transformed into its active metabolite, 4,4′-

dihydroxydiphenyl-(2-pyridyl) methane, in the colon by bacteria. It facilitates bowel evacuation by increasing peristalsis frequency and force.[12] There are instances of cases when SPS Solutions for bowel preparation can result in serious hyponatremia in certain individuals.[11,13] In a study conducted by Cohen CD et al., forty individuals had their hyponatremia evaluated both before and after a colonoscopy; 7.5% of patients experienced hyponatremia following the procedure, which was accompanied by an increase in arginine vasopressin (AVP).[14] In this clinical context, it has been reported that the release of AVP due to volume depletion brought on by bowel preparation is a trigger for hyponatremia. Hyponatremia is a dangerous consequence that, if it develops quickly, can be fatal because of its related complications. Our study aimed to find out the prevalence of hyponatremia in individuals undergoing bowel cleaning with SPS solution before a colonoscopy. In our investigation, the blood sodium levels before and after ingesting SPS did not significantly differ from one another. The results of a research of Rahman A et al., which showed that individuals who received SPS solution did not significantly alter their mean glucose and salt levels, supported our findings. Hypokalemia and hypocalcaemia were also noted in the same study's results, however they recovered to baseline in less than a day.[15] However, compared to polyethylene glycol solution, SPS bowel preparation solution was linked to a greater incidence of hospitalization for hyponatremia in a separate study by Weir MA et al.[13] As "a possible but ignored outcome of bowel preparation for colonoscopy," hyponatremia has been documented.[16] Because this issue can lead to electrolyte imbalances, which might have major neurological consequences, colonoscopists should be aware of it.

Our study limitation

Our study had a modest sample size and was conducted at a single Centre. We only looked at sodium-related electrolyte imbalances caused by SPS in our patients' evaluations.

Conclusion

None of our patients had any significant side effects. Patients having colonoscopy before using SPS bowel preparation fluid and their blood sodium levels prior to the procedure did not significantly differ from one another. SPS is a bowel preparation solution that is both safe and easy. No patient experienced any severe side effects, and none of the patients' serum sodium levels changed noticeably. However, it is impossible to determine if it is safe for people to use if they already have comorbidities or irregular electrolytes.

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