

CASE REPORT

Clinical Study on Serum Sodium and Potassium Levels In Case Of Ileostomy

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ABSTRACT

**BACKGROUND AND OBJECTIVES:** Usually an excess loss of fluid and/ or electrolytes occurs through gastrointestinal tract, respiration, skin, kidney and other abnormal process of elimination like vomiting, fistulas, third space sequestration (where they are not at free equilibrium with rest of the extracellular body fluid) and surgically created ostomies like ileostomy and colostomy. These ostomies effluent is very significant with loop ileostomy with partial resection of ileum, ileostomy and least with colostomy. Our objective is to Study serum sodium and potassium level changes in operated cases of ileostomy. **METHODS:** This randomized observational prospective cohort study has been carried out in 25 cases of operated cases in which ileostomy done, admitted to department of general surgery in P.D.U Medical College & Hospital , Rajkot from November 2015 to till October 2017. taking proper consent and counseling and evaluated clinically by amount of stoma output, urine output, routine and special investigation (serum electrolytes: sodium, potassium) in Biochemistry department of Rajkot civil hospital by instruments and following measuring techniques- sodium and potassium were measured by ion selective electrode. **RESULTS:** The study aimed for serum sodium and potassium level changes in operated cases of ileostomy on post-operative day 1st ,3rd,5th . The study shows that:Age of the patient varied from 13 years to 74 years with maximum number of patients seen in the 25-49 years of age group,The most common presentation was abdominal pain (ileal perforation).The value serum sodium ranges 141-130 mmol/l on post-operative day 1, 140-127 mmol/l on post-operative day 3 and 138-123 mmol/l on post-operative day 5,The values of serum potassium ranged from 3.2-4.5mmol/l on postoperative day 1, 4.4-3 mmol/l on postoperative day 3 and 4.3-2.9mmol/l on postoperative day 5. **CONCLUSION:** Patients, who underwent ileal resection in addition to ileostomy, had a significantly higher stoma output. The patients showed a significant fall in serum electrolyte levels, especially sodium, potassium. Serum sodium value fell below normal range by the 5th post operative day.

**Keywords:** serum sodium and potassium level,ileostomy

INTRODUCTION

For many years' salt and water depletion has been recognized as a complication of the early post-operative period in patients with an ileostomy. Gallagher and his colleagues' described episodes of salt and water depletion occurring in patients with well-established ileostomies. Later work suggested that even apparently healthy patients with an ileostomy have persistent depletion of sodium and water.

Trnberg and his colleagues reported that their patients had normal extracellular and total body water volumes, although they did find that total exchangeable sodium and potassium were reduced. As these electrolytes were normal in these subjects, they concluded that there must be an intracellular depletion of sodium and potassium. Despite evidence for sodium conservations by the kidney and intestine in patients with an ileostomy. Plasma aldosterone concentrations have been found to be normal but the number of patients studied were small. Increased fluid and electrolyte losses are the inevitable result of an ileostomy. They are most marked during the post-operative period and continue even when normal ileostomy function is established. Fowler, Cooke, Brooke, and Cox (1959) state that

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the body is then well able to conserve essential fluid and electrolytes; this view is supported by two large follow-up studies by Rogers, Bargaen, and Black (1954) and by Brooke (1956) who do not mention the occurrence of fluid and electrolyte disturbances.

**MATERIALS AND METHODS**

This prospective study is carried out in the department of general surgery in the various surgical wards in our institute.

The number of cases considered for the study were 25.

**Study setting:**

All patients admitted to Rajkot civil hospital in whom ileostomy with or without ileal/colon resection.

**Study period:**

Study was conducted after ethical approval from November 2015 to October 2017.

**Sampling Technique:**

Purposive sampling

**Statistical Method:**

randomized observational prospective cohort study.

**OBSERVATIONS**

**Table 1: Sex Distribution**

SEX	NO OF PATIENTS
MALE	19
FEMALE	6

It shows out of 25 patients 19(76%) are male and 6(24%) are female patients.

**Table 2: Age Distribution**

AGE(YRS)	TOTAL NO OF PATIENTS (%)
<25	3(12%)
25-49	14(56%)
50-74	8(32%)
TOTAL	25(100%)

It reveals that the maximum number of patients were in the 25-49yrs. age group, i.e., 14 (including 19 male and 06 female) and the youngest patient was 13yrs old and the oldest one being 74yrs old. The mean age of the patients was 41.84yrs. (male: 42.57yrs; female: 39.6yrs).

**Table 3: Case distribution according to the diagnosis**

DIAGNOSIS	NO.OF CASES	PERCENTAGE (%)
(1) intestinal Perforation with peritonitis (enteric/t.b/ Other)	18	72
(2)INTESTINAL OBSTRUCTION WITHOUT PERITONITIS	3	12
(3)INTESTINAL OBSTRUCTION WITH PERITONITIS	3	12
(4)PENETRATING INJURY ABDOMEN WITH BOWEL INJURY	1	4
TOTAL	25	100

the majority of the patients who underwent stoma creation were of perforative peritonitis 18(72%) patients following typhoid, tubercular or non –specific enteritis. 3 patients (12%) presented with intestinal obstruction, All cases had malignancy. 3 cases in addition to obstruction had associated peritonitis (2 cases of sigmoid volvulus and 1 cases of adhesion obstruction). The remaining 1 cases had stoma creation due to penetrating injury abdomen.

**Table 4: Comparison of serum sodium (mmole/lit), in Ileostomy patients**

Patient groups	1st post-operative day (a)	3rd post-operative day (b)	5th post-operative day (c)
Ileostomy with resection of small/Large intestine	135.77	134.04	131.63
Ileostomy + no resection of small/Large intestine	137	136	135.33

In the group having all ileostomy patients, when post-operative day 1 reading was compared to post-operative day 3 and 5 readings, a lower reading was observed on post-operative day 3 and day 5. When post-operative day 3 reading was compared to post-operative day 5 reading, a lower reading was observed on post-operative day 5.

2) In the group having ileostomy with resection of small bowel, when post-operative day 1 reading was compared to post-operative day 3 and 5 readings, a

lower value was observed on post-operative day 3 and day 5.

3) In the group having stoma with no resection of small intestine, change was observed with post-operative day 1 and day 3 readings when compared. However, lower reading was observed on post-operative day 5. Changes in the serum sodium level between post-operative day 3 and 5, were NOT significant.

The value serum sodium ranges 141-130 mmol/l on post-operative day 1, 140-127 mmol/l on post-operative day 3 and 138-123 mmol/l on post-operative day 5.

**Table 5: Comparison of serum potassium (mmol/lit) in Ileostomy patients.**

Patients groups	Day1(a)	Day3(b)	Day5(c)
Ileostomy +resection of small/Large intestine	3.9	3.8	3.7
Stoma + no resection of small/Large intestine	4.23	4.06	4.1

In the group having ileostomy with resection of small intestine, when post-operative day 1 reading was compared to postoperative day 3 and day 5 readings, lower value was observed on postoperative day 3 and day 5.

In the group having stoma with no resection of small intestine, when postoperative day 1 reading was compared to postoperative day 3 and day 5 readings, no significant changes found.

The mean values of serum potassium remained within the normal range in the postoperative period in all groups.

The values of serum potassium ranged from 3.2-4.5mmol/l on postoperative day 1, 4.4-3 mmol/l on postoperative day 3 and 4.3-2.9mmol/l on postoperative day 5.

Table 5: Comparison of serum potassium (mmol/lit) in Ileostomy patients.

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**Table 6: comparison between stoma output(ml) and S.sodium level(mmol/lit).**

Stoma output	3 <sup>rd</sup> POD	5 <sup>th</sup> POD
<500 ml	134.15	133.33
500-1000 ml	134.67	131.95

As stoma output increases, from 3rd POD TO 5th POD serum sodium level decreases on both group of patients with stoma output <500 ml/day and stoma output between 500-1000ml/day.

**Table 7: comparison between stoma output(ml) and Serum potassium level(mmol/lit).**

Stoma output	3 <sup>rd</sup> POD	5 <sup>th</sup> POD
<500 ml	3.79	3.83
500-1000 ml	4.67	3.70

As stoma output increases, from 3rd POD TO 5th POD serum potassium level decreases on both group of patients with stoma output <500 ml/day and stoma output between 500-1000ml/day.

**DISCUSSION**

Creation of ileostomy is done to save the patient's life. the majority of the patients who underwent stoma creation were of perforative peritonitis 18(72%) patients following typhoid, tubercular or non – specific enteritis. 3 patients (12%) presented with intestinal obstruction, All cases had malignancy. 3 cases in addition to obstruction had associated peritonitis (2 cases of sigmoid volvulus and 1 cases of adhesion obstruction). The remaining 1 case had stoma creation due to penetrating injury abdomen. When the amount of stoma effluent is around or less than 500 ml, it is low volume stoma, and when the volume of stoma output is 1 lit or more, it is high volume stoma. Patients with stoma output less than 1 lit daily are seldom troubled. On the other hand, patients with high output stoma are prone to salt and water depletion .Especially when there is associated partial resection of ileum, resulting in unusually profuse ileostomy output. Some of the observation and conclusion by A.O. Wilson, Department of Surgery, Postgraduate medical school of London, is as follows:10

a) In the immediate post-operative period of terminal ileostomy, it may be

difficult to maintain a satisfactory state of hydration.

- b) Sodium deficiency is very liable to develop, because the sodium content of ileostomy fluid is greater than that of chloride.
- c) Treatment by sodium citrate by mouth should be begun as soon as possible after operation. Large amount may be required, together with additional sodium chloride if the ileostomy is very active. Much is now known about the metabolism of sodium and potassium and their effects on the body when these electrolytes are deficient. Their loss through skin, kidney and bowel has been studied. But less is known about their excretion through artificially created stoma of the bowel.

Fowler DI had suggested that the amount of sodium required for replacement therapy during the first few postoperative days could be calculated by rule of thumb procedure in which, 300meq of sodium chloride was given for each liter of ileostomy fluid loss. They thought that provided potassium deficiency was corrected before operation, potassium supplement were unnecessary after operation, unless enteritis developed.

Adaptation of ileostomy usually develops after a period of several weeks of operation. With decrease in the volume of fluid lost and in the concentration of sodium, potassium in it (Lockwood and Randall, 1949).

We studied the serum sodium and serum potassium level changes in operated cases of ileostomy patients with or without small bowel resection. we have given post op fluids mainly in form of NS, RL, ISOM, D5%. with average fluid given post operatively is 8600ml upto patient started full diet with no further i.v. fluid requirements. Kuri, Dr. Chhanda Das, Department of Surgery, Bankura Sammilani Medical College, Bankura, India in 2012-2013 yr.

#### 1. Age Distribution

In our study, the age ranged from 1 reveal that the mean age of the patients was 41.84

yrs. (male: 42.57yrs; female: 39.6yrs). while in Sankha Suvra Ganguly et al study it was 43.36yrs.

#### 2. Sex Distribution

In our study, total percentage of male patient in which ileostomy done is 76% and total percentage of female patient in which ileostomy done is 24% patients. while in Sankha Suvra Ganguly et al study total percentage of male patient in which ileostomy done is 60% and total percentage of female patient in which ileostomy done is 40% patients.

#### 3. Post Operative Stoma Output On Pod 3RD (In MI)

On day 3rd, post operative stoma output was 416.66 ml in our study while in Sankha Suvra Ganguly et al study was 476ml in ileostomy with no resection of small/large bowel group.

On day 3rd, post operative stoma output was 411.36 ml in our study while in Sankha Suvra Ganguly et al study was 525 ml in ileostomy with resection of small/large bowel group.

#### 4. Post Operative Stoma Output On Pod 5TH(In MI)

On day 5th, post operative stoma output was 516.66 ml in our study while in Sankha Suvra Ganguly et al study was 671ml in ileostomy with no resection of small/large bowel group.

On day 5th, post operative stoma output was 620.45 ml in our study while in Sankha Suvra Ganguly et al study was 833ml in ileostomy with resection of small/large bowel group.

#### 5. Comparison of serum sodium (mmole/lit), in Ileostomy patients on POD 1st

In our study, post operative serum sodium was significantly lower than that of Sankha Suvra Ganguly et al study on POD 1st with in all ileostomy patients was 137.8 mmole/lit while in our study was 135.92 mmole/lit On POD 1st.

#### 6. Comparison of serum sodium (mmole/lit), in Ileostomy patients on POD 3rd

While patients in our study with

In our study, post operative serum sodium was significantly lower than that of Sankha Suvra Ganguly et al study on POD 3rd with in all ileostomy patients was 136.6mmole/lit while in our study was 133.52mmole/lit On POD 3rd.

**7. Comparison of serum sodium (mmole/lit), in Ileostomy patients on POD 5th**

In our study, post operative serum sodium was significantly lower than that of Sankha Suvra Ganguly et al study on POD 5th with in all ileostomy patients was 135.4mmole/lit while in our study was 131.6mmole/lit On POD 5th.

**8. Comparison of serum potassium (mmol/lit) in Ileostomy patients on POD 1st**

In our study, post operative serum potassium was same that of Sankha Suvra Ganguly et al study on POD 1st with in all ileostomy patients was 3.9 mmole/lit while in our study was 3.9 mmole/lit On POD 1st.

**9. Comparison of serum potassium (mmol/lit) in Ileostomy patients on POD 3rd**

In our study, post operative serum potassium was same that of Sankha Suvra Ganguly et al study on POD 3rd with in all ileostomy patients was 3.8 mmole/lit while in our study was 3.86 mmole/lit On POD 3rd.

**10. Comparison of serum potassium (mmol/lit) in Ileostomy patients on POD 5th**

In our study, post operative serum potassium was same that of Sankha Suvra Ganguly et al study on POD 5th with in all ileostomy patients was 3.7mmole/lit while in our study was 3.7mmole/lit On POD 5th.

**CONCLUSION**

Clinical study on serum sodium and potassium level changes in operated cases of ileostomy was carried out at P.D.U Medical College & Hospital Rajkot, Gujarat, India. It included 25 cases of ileostomy from November 2015 to October 2017. The study concludes as follow

The stoma output was found to be higher in patients having ileostomy and was significantly higher in patients who had additional ileal segment resection done. Serum potassium level showed a significant decrease in patients with ileostomy, especially those having additional resection of ileal segment in the postoperative period, on the 5th postoperative day. From the study, it can be concluded that:

(1) Patients undergoing ileostomy have average stoma output i.e., around 500-600ml/day; all these patients showed a fall in electrolyte value in early post-operative period, but the mean values tend to remain in normal range.

(2) Patients, who underwent ileal resection in addition to ileostomy, had a significantly higher stoma output. The patients showed a significant fall in serum electrolyte levels, especially sodium, potassium. Serum sodium value fell below normal range by the 5th post operative day.

**REFERENCES**

1. Kanaghinis T, Lurban M and Coghil NF. The composition of ileostomy fluid. *Gut* 1963; 3: 322- 338.
2. Hill GL, Mair WSJ, Goligher JC. Cause and management of high volume output salt depleting ileostomy. *Br J Surg* 1975; 62: 720-726.
3. Hill GL, Goligher JC, Smith AH, Mair WS. Long term changes in total body water, total exchangeable sodium and total body potassium before and after ileostomy. *Br J surg*
4. Gallagher ND, Harrison DD, Skyring AP. Fluid and electrolyte disturbances in patients with long established ileostomies. *Gut* 1962; 3: 219- 223.
5. Fowler DI, Cooke WT, Brooke BN, Cox EV. Ileostomy and electrolyte excretion. *Am J Dig Dis* 1959; 4: 710-720.
6. "Development of the Small intestine". Larsen's human embryology (4th ed.). Philadelphia: Churchill Livingstone/Elsevier. p. 237

7. Townsend et al. (2004) Sabiston Textbook of Surgery, Elsevier
8. Phillips SF, Giller J. The contribution of the colon to electrolyte and water conservation in man. *J Lab Clin Med* 1973; 81: 733-46.
9. Carmicheal D, Few J, Peart S, Unwin R. Sodium and water depletion in ileostomy patients. *Lancet* 1986; 13: 625.
10. Robertson I, Leung E, Hughes D, Splers M, Donnelly L, Mackenzie I, et al. Prospective analysis of stoma-related complications. *Colorectal Dis* 2005;7:279-85.
11. Wilson AO, B.Sc., M.B, Ch.B., F.R.C.S.E., Observation on serious disturbance of water and electrolyte metabolism in patient with terminal ileostomy Dept of Surgery, PostGraduate Medical School of London.
12. Abbot, WE, Krieger H, Babb. Metabolic alteration in surgical patients I. The effects of altering the electrolyte, carbohydrates, and amino acid intake. *AMA Annals of Surgery*, 1963; 138: 434.
13. Lockwood JS and Randall HT. The place of electrolyte studies in surgical patients. *Bull New Y Acad ed* 1949; 25: 228.
14. Evaluation of Changes in Serum Sodium and Potassium Following Ileostomy and Colostomy Dr Sankha Suvra Ganguly, Dr. Ashis Kumar Saha, Dr Sampurnanand Jha, Dr Supratim Bhattacharyya , Dr Shib Shankar Kuri, Dr. Chhanda Das. 1Department of Surgery, Bankura Sammilani Medical College, Bankura, India *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 13, Issue 7 Ver. II (July. 2014), PP 38-46 [www.iosrjournals.org](http://www.iosrjournals.org),