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To study role of serum potassium in post op exploratory laparotomy

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Abstract
Background: Laparotomies are one of the most commonly performed surgeries on an emergency basis. Potassium is one of the major extra cellular ion is of primary importance is reflecting changes of water and electrolytes status in the body. Hence; the present study was conducted for assessing the alterations in serum potassium levels during post op exploratory laparotomy.
Materials & methods: A total of 40 subjects who underwent explorative laparotomy were enrolled in the present study. A Performa was made and all the relevant data of all the subjects was recorded. Physical and general examination of all the subjects was carried out. Collection of 2 cc of blood volume was done at preoperative time, one the day of surgery and on postoperative days of surgery. All the samples were sent to laboratory where autoanalyzer was used for assessment of serum potassium levels. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.
Results: Mean potassium levels One day before surgery, Baseline (before starting of surgery), One day after surgery, Three days after surgery and Seven days after surgery were found to be 4.29 respectively, 4.79 respectively, 5.12 respectively, 4.32 respectively and 4.25 mEq/L respectively. A significant reduction in the potassium levels during the initial postoperative phase was seen followed by a significant rise; thereby returning to normal value 1 week postoperatively.
Conclusion: A transient significant rise in the potassium levels occur after exploratory laparotomy, followed by restoration to normal values by the end of first postoperative week. The study also emphasized that early recognition and identification of the early warnings of hypokalemia is necessary to avoid risk of development of associated adverse events.

Keywords: Potassium, exploratory, laparotomy

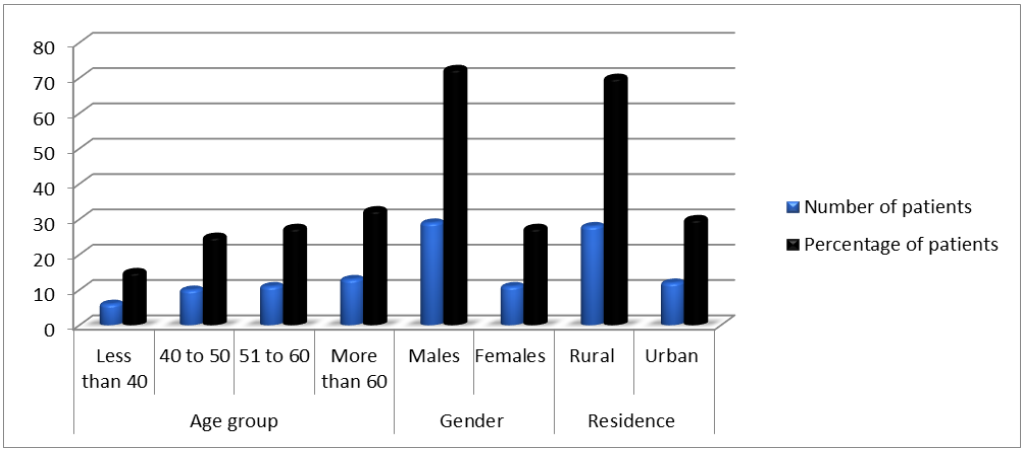
Introduction
In blunt trauma, an exploratory laparotomy is performed to identify organ or vascular injuries, which might not be detected using imaging modality. Laparotomies are one of the most commonly performed surgeries on an emergency basis. It may be done on a patient presenting with acute abdomen or trauma. Most of the time, it is done as a life-saving procedure. The decision to proceed with laparotomy is very important and crucial. It is done only after doing the necessary investigations, to reach a provisional diagnosis, provided the patient is clinically stable [1-3].
Post-operative potassium metabolism has long been the focus of research. Numerous studies have demonstrated that hypokalemia is an independent risk factor for post-operative complications. In clinical settings, pre-existing hypokalemia is frequently detected via initial serum potassium measurement at hospital admission, which usually results in considerable delay of elective laparotomy. The etiology of hypokalemia is far beyond such common causes as insufficient intake or excessive discharge of potassium. Postoperative supplementary potassium has recently been demonstrated to accelerate the recovery of gastrointestinal function; however, supplementation is rarely given in the pre-hospital period [4-7]. Hence; the present study was conducted for assessing the alterations in serum potassium levels during post op exploratory laparotomy.

Materials & Methods
The present study was conducted in the department of general surgery of the medical institute and it included assessment of alterations in serum potassium levels during postoperative

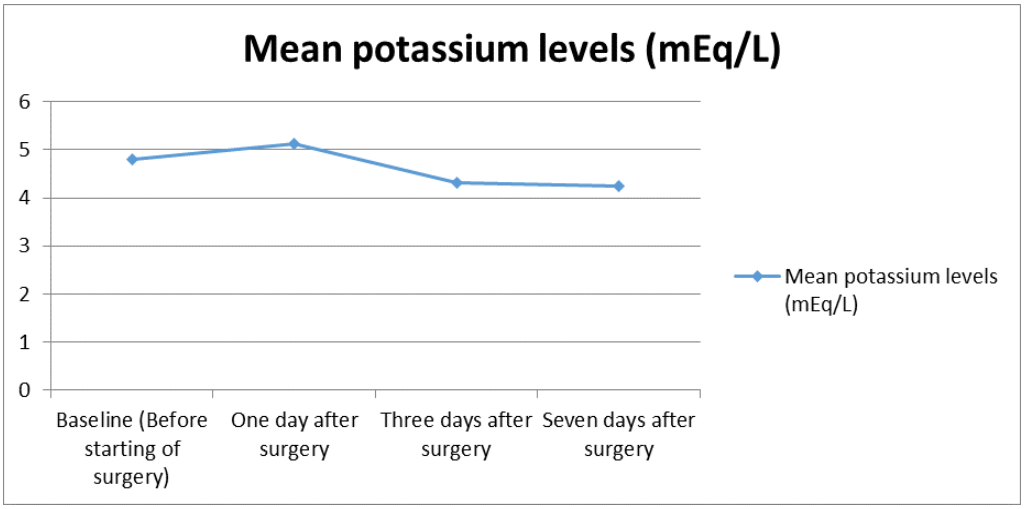
exploratory laparotomy. A total of 40 subjects who underwent explorative laparotomy were enrolled in the present study. Hypertensive patients, diabetic patients and patients with history of any other systemic illness were excluded from the present study. Complete demographic and clinical details of all the patients were recorded. A Performa was made and all the relevant data of all the subjects was recorded. Physical and general examination of all the subjects was carried out. Collection of 2 cc of blood volume was done at preoperative time, one the day of surgery and on postoperative days of surgery. All the samples were sent to laboratory where autoanalyzer was used for assessment of serum potassium levels. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

Results

In the present study, a total of 40 patients who underwent exploratory laparotomy were enrolled. Mean age of the patients was 60.4 years. 72.5 percent of the patients were males while the remaining were females. Mean potassium levels at Baseline (before starting of surgery), One day after surgery, Three days after surgery and Seven days after surgery were found to be 4.79 mEq/L, 5.12 mEq/L, 4.32 mEq/L and 4.25 mEq/L respectively. A significant reduction in the potassium levels during the initial postoperative phase was seen followed by a significant rise; thereby returning to normal value 1 week postoperatively.



Graph 1: Demographic profile



Graph 2: Mean potassium levels at different time intervals

Table 1: Comparison of potassium levels

Group Versus Group		t-value	p- value
Baseline	One day after surgery	-1.785	0.00*
	Three days after surgery	-1.482	0.01*
	Seven days after surgery	-2.625	0.03*
One day after surgery	Three days after surgery	-3.118	0.04*
	Seven days after surgery	-1.422	0.00*
Three days after surgery	Seven days after surgery	2.765	0.74

*: Significant

Discussion

Patients undergoing abdominal surgery develop episodes of impaired gastrointestinal motility and even postoperative ileus. Prolonged gastrointestinal paralysis after surgery may result in longer hospital stays and increased medical costs. Electrolyte homeostasis, particularly the blood potassium level, is very important for postoperative recovery of gastrointestinal function. Several studies suggested that hypokalemia was an independent risk factor for postoperative complications, including delayed recovery of gastrointestinal motility, while sufficient potassium

supplementation might accelerate recovery of gastrointestinal function [7, 8]. Hence; the present study was conducted for assessing the alterations in serum potassium levels during post op exploratory laparotomy.

In the present study, a total of 40 patients who underwent exploratory laparotomy were enrolled. Mean age of the patients was 60.4 years. 72.5 percent of the patients were males while the remaining were females. Mean potassium levels Baseline (before starting of surgery), One day after surgery, Three days after surgery and Seven days after surgery were found to be 4.79 mEq/L, 5.12 mEq/L, 4.32 mEq/L and 4.25 mEq/L respectively. Variable results have been reported in past literature in this context.

Guanzhen Lu *et al*. evaluated the significance of pre-hospital and post-operative serum potassium level monitoring and hypokalemia intervention in laparotomy patients with hypokalemia. A total of 118 laparotomy patients with hypokalemia were randomly divided into an intervention group (N = 60) and a control group (N = 58). Average serum potassium levels at admission, time period of drinking, and time of first bowel sound after laparotomy differed significantly ($p < 0.001$) between the two groups. Average serum potassium levels, first time of defecation, urination, and ambulation at 24 h and 48 h post-operation differed significantly ($p < 0.05$) between the two groups. An optimal pathway of serum potassium monitoring not only saves limited ward space but also allows for early correction of hypokalemia in patients undergoing laparotomy [6]. There was no significant difference observed in the serum electrolyte levels by Maria valadao *et al.* (2015), and Keshab *et al.* (2014), whereas the studies of Shenqi *et al*. (2013), and Kumkum *et al*. (2010), Krishnamoorthy & Shobha (2002) reported an increase in the serum potassium levels post operatively [7- 11].

Blood potassium levels could differ slightly among individuals and were very important during perioperative management of patients undergoing abdominal surgery. Abdominal surgery is a main category of general surgery, and, furthermore, the effects of postoperative potassium metabolism in patients are always a concern for physicians. The first measurement of the serum potassium level after admission to the hospital shows that many patients had had hypokalemia before, which could not be explained by common causes such as inadequate intake or excessive loss of potassium. With the development of economy, improvement of living standards, increase in work pressure, and changes in lifestyle, the primary disease spectrum has altered greatly, resulting in hypertension and diabetes mellitus (DM) becoming very common conditions [12- 15].

In the present study, a significant reduction in the potassium levels during the initial postoperative phase was seen followed by a significant rise; thereby returning to normal value 1 week postoperatively. Our results were in concordance with the results obtained by previous authors. Nausheen N *et al.* studied serum electrolyte changes in post-operative cases (patients undergoing Explorative Laparotomy) and to study which serum electrolyte is markedly changed in post-operative patients. Their study showed significant changes in serum electrolyte in post-operative period [16].

Conclusion

From the above results, the authors concluded that a transient significant rise in the potassium levels occur after exploratory laparotomy, followed by restoration to normal values by the end of first postoperative week. The study also emphasized that early recognition and identification of the early warnings of hypokalemia is necessary to avoid risk of development of associated adverse events.

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