

**Original research article**

# A prospective study of elevated blood c-reactive protein and d-lactate Biomarkers for intestinal blockage bowel gangrene prediction

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## **Abstract**

**Introduction and Objectives:** Intestinal blockage is a prevalent clinical issue frequently encountered in the field of surgery. A significant consequence associated with intestinal obstruction is the occurrence of strangulation, which necessitates the surgical procedures of resection and anastomosis of the affected intestine segment. This study aims to investigate the potential utility of a combination of elevated serum c-reactive protein and d-lactate.

**Materials and Methods:** This study was conducted as a prospective single-center study. The present investigation was carried out at Department of General Surgery, Mahavir Institute of Medical Sciences, Telangana, India spanning the period from July 2021 to June 2022. The present investigation encompasses a cohort of 50 individuals who have clinical manifestations consistent with intestinal blockage and strangulation.

**Results:** The prevalence of emesis among the patient population was 52%, with the remaining 48% of patients reporting no instances of vomiting. Approximately 45% of the individuals had symptoms of obstipation, while the remaining instances did not manifest this particular symptom. Abdominal distension was observed in 48% of the cases, whilst the remaining 52% did not exhibit abdominal distension. In 60% of the cases, the presence of guarding was seen, whilst the remaining cases did not exhibit any signs of guarding or rigidity.

**Conclusion:** Strangulation is the most serious disease complication that may necessitate emergency surgery. In acute intestinal strangulation, time is crucial. Early diagnosis and treatment improve prognosis. Clinical evaluation and team expertise determine strangulation diagnosis. Bowel Gangrene in Intestinal Obstruction can be predicted by serum LDH and CRP.

**Keywords:** Lactate dehydrogenase, intestinal obstruction, bowel gangrene

## **Introduction**

Intestinal blockage is a frequently encountered issue in surgical practice. The term "gastrointestinal obstruction" refers to the functional or mechanical disruption of the typical flow of substances throughout the gastrointestinal system. The obstruction may arise from factors originating either internally or externally to the wall, or within the lumen. The condition might manifest as either a partial or complete state<sup>[1,2]</sup>. The distinctive consequences of this condition involve the accumulation of gas and air within the colon, resulting in the distension of the bowel wall. This results in the accumulation of fluid within the lumen, leading to the straining of the intestinal wall and potentially compromising its perfusion. The potential cause of functional blockage could be attributed to the impaired functionality of the splanchnic nerve. The location of occurrence can be either within the small intestine or the large intestine. In the context of the small intestine, where it exhibits a higher prevalence<sup>[3,4]</sup>.

The aforementioned condition is linked to elevated rates of illness and imposes a significant financial burden on hospitals worldwide<sup>6</sup>. One of the primary factors contributing to admission in the surgical intensive care unit (ICU) and emergency department is a significant determinant. The condition of intestinal obstruction necessitates prompt detection, diagnosis, and treatment due to its grave nature<sup>[5]</sup>. The numerical values 8 and 9 are being referenced. One of the obstacles associated with acute bowel obstruction is in the difficulty of distinguishing between simple and serious cases of acute intestinal obstruction. Determining the necessity of emergency surgery vs the sufficiency of non-operative procedures is a critical consideration<sup>[6,7]</sup>.

The determination regarding the management of acute intestinal blockage should be established by considering a range of clinical, laboratory, and radiographic criteria. Even clinicians who possess extensive knowledge and employ effective laboratory and radiographic tests encounter difficulties when

determining the appropriate course of action for managing cases of acute intestinal blockage. The prompt identification and precise determination of the obstruction, as well as its underlying cause, are crucial for the successful treatment and favorable outcome. The clinical presentation, underlying causes, and prevalence of strangulation remain ambiguous, resulting in a lack of consensus regarding the usual approach to management [8, 9].

Strangulation represents the most severe consequence of the sickness, potentially necessitating an urgent medical intervention. Emergency laparotomy is considered the preferred treatment option. Complications of strangulation are encountered in a range of around 7% to 42% of cases involving intestinal blockages. Efficient time management is crucial in the management of acute intestinal strangulation. The prognosis is more favorable when the diagnosis and intervention occur earlier [10, 11]. The determination of strangulation is contingent upon the comprehensive clinical assessment and the proficiency of the medical professionals responsible for examining the individual.

### Materials and Methods

This study was conducted as a prospective single-center study. The objective of this study is to investigate the potential utility of a combination of elevated blood C-reactive protein and D-lactate levels as biomarkers for predicting the occurrence of bowel gangrene in cases of intestinal obstruction. The present investigation was carried out at Department of General Surgery, Mahavir Institute of Medical Sciences, Telangana, India spanning the period from July 2021 to June 2022. The present investigation encompasses a cohort of 50 individuals who have clinical manifestations consistent with intestinal blockage and strangulation.

### Inclusion criteria

- All emergency ward patients with intestinal obstruction indicators.

### Exclusion criteria

- Patients not want to participate in the study.
- Patients with Mesenteric vascular Ischemia.

### Methodology

A cohort of 50 consecutive adult patients who exhibited symptoms of intestinal blockage were enrolled from the emergency department of GMKMC hospital in Salem. The study included individuals who exhibited clinical indications of intestinal blockage and those who underwent emergency surgery. The identification of intraoperative abnormalities resulted in the categorization of patients into two distinct groups: those with uncomplicated blockage and those with strangulated intestinal obstruction.

### Results

The provided information reflects the distribution of patients' ages. The average age of the sample population is 51.13 years, with a standard deviation of 12.2 years. The study population consisted predominantly of male patients, with the remaining participants being female. Fifty patients exhibited symptoms of stomach pain, whereas the other individuals did not report any discomfort in the abdomen region. A total of 40% of the patients had irreducible edema, whereas the other patients did not display any signs of irreducible swelling. The prevalence of emesis among the patient population was found to be 52%, with the remaining 48% of patients reporting an absence of vomiting. Approximately 45% of the individuals exhibited symptoms of obstipation, while the remaining instances did not manifest this particular condition. Abdominal distension was observed in 48% of the cases, whilst the remaining 52% did not exhibit abdominal distension.

### Past history of surgery

The subsequent table presents a chronological record of past surgical procedures. Approximately 60% of the participants did not possess any prior surgical history.

**Table 1:** History of surgery

Sr. No.	Previous Surgery	Number	%
1.	Appendectomy	2	4.0
2.	Appendectomy & hysterectomy	2	4.0
3.	Hysterectomy	4	8.0
4.	Laparotomy - obstruction	1	2.0
5.	Laparotomy - perforation	3	6.0
6.	Laparotomy - tumour excision	3	6.0
7.	Laparotomy-tumour excision	2	4.0
8.	Repeated laparotomy-adhesiolysis	2	4.0
9.	Umbilical hernia repair	3	6.0
10.	Nil	30	60.0

11.	Total	50	100.0
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**Etiology of obstruction**

The causes of the obstruction are outlined in the table that follows.

**Table 2:** Etiology

Sr. No.	Etiology	Number	%
1.	Adhesive Intestinal Obstruction	10	20.0
2.	Carcinoma Colon	12	24.0
3.	Internal Hernia	3	6.0
4.	Intussusception	2	4.0
5.	Obstructed Femoral Hernia	10	20.0
6.	Obstructed Internal Hernia	12	24.0
7.	Post-operative Contraction Band	08	16.0
8.	Sigmoid Volvulus	05	10.0
9.	Uremic Bowel Obstruction	02	4.0
10.	Total	50	100.0

**Inferential statistics**

The subsequent table presents the average serum LDH and CRP levels across three groups categorized by the extent of gangrene seen. Patients diagnosed with gangrene exhibited elevated levels of serum lactate dehydrogenase and C-reactive protein.

**Table 3:** Mean, Median and Range of the serum LDH and CRP levels

	LDH Normal	CRP Normal	LDH Gangrene	CRP Gangrene	LDH Pre-gangrene	CRP Pre-gangrene
N	46	46	30	30	12	12
Mean	162.24	9.25	878.34	119.57	414.98	28.37
Median	129.6	6.1	857.1	132.1	425.1	25.2
SD	114.2	10.6	190.6	28.7	57.38	11.1
Min.	101.01	5.24	340.03	5.24	319.787	6.00
Max.	750.01	51.03	1214.01	163.07	495.03	50.00

Approximately 35% of the patients exhibited the presence of bowel noises, whilst the remaining patients did not demonstrate any bowel sounds. The majority of individuals experienced symptoms for a duration exceeding 48 hours. Approximately 22% of the individuals experienced symptoms within a time frame of 24 to 48 hours, but the remaining majority exhibited symptoms for a duration of less than 24 hours. Approximately 81% of the participants had no prior surgical history. In 31% of the patients, the presence of intestinal gangrene was seen, whereas the remaining cases exhibited either normal or pre-gangrenous states. Patients diagnosed with gangrene exhibited elevated levels of both mean serum lactate dehydrogenase and C-reactive protein in their blood samples. Serum lactate dehydrogenase and serum C-reactive protein have been identified as valuable biomarkers for the prediction of bowel gangrene in cases of intestinal obstruction. The age distribution of the patients is presented in the following manner. The average age of the sample population is 51.13 years, with a standard deviation of 12.2 years.

**Discussion**

The present study examines the potential of utilizing a combination of elevated serum C-reactive protein and D-lactate levels as biomarkers for the accurate prediction of bowel gangrene in patients with intestinal obstruction. The study cohort consisted of 50 individuals who had clinical manifestations indicative of intestinal obstruction and strangulation. The study included the selection of all patients who presented with acute intestinal blockage. Prior to the operation, serum CRP and D-lactate levels were measured and their increase was examined in relation to the per-operative identification of bowel gangrene [11-13].

The prevalence of vomiting among patients was found to be 52%, with the remaining 48% of patients not experiencing vomiting. Approximately 45% of the individuals exhibited symptoms of obstipation, while the remaining instances did not manifest this particular condition. Abdominal distension was observed in 48% of the cases, whilst the remaining 52% did not exhibit any signs of abdominal distension. In 60% of the cases, the presence of guarding was seen, whereas the remaining cases did not exhibit any signs of guarding or rigidity [14, 15].

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presence of intestinal gangrene was seen, whereas the remaining cases exhibited either a normal state or a state preceding gangrene. Patients with gangrene exhibited elevated levels of mean serum LDH and serum CRP [18-21].

Acute mechanical intestinal obstruction is a frequently encountered surgical emergency in the field of abdominal surgery. The condition is correlated with heightened morbidity rates and imposes a significant fiscal burden on hospitals worldwide. One of the primary factors contributing to admission in the surgical intensive care unit (ICU) and emergency department is a significant determinant. Intestinal blockage is a critical medical issue necessitating prompt detection, diagnosis, and intervention [22]. One of the primary difficulties associated with acute bowel blockage is in the inherent problem of distinguishing between cases of simple and complicated acute intestinal obstruction. Determining the necessity of emergency surgery vs the sufficiency of non-operative procedures is a crucial consideration [23-25].

The determination regarding the management of acute intestinal blockage should be predicated upon a comprehensive evaluation of diverse clinical, laboratory, and radiographic criteria. Determining the appropriate course of action for acute intestinal obstruction presents a significant challenge even for seasoned clinicians who possess proficient laboratory and radiographic protocols [26, 27]. The prompt and precise identification of the obstruction, as well as its underlying cause, is crucial for the successful treatment and favorable outcome. The clinical presentation, underlying causes and prevalence of strangulation lack sufficient evidence, resulting in an absence of a standardized approach to management [28-29].

Strangulation represents the most severe consequence of the sickness, potentially necessitating an urgent intervention. Emergency laparotomy is considered the preferred treatment option. Complications of strangulation are encountered in a range of 7% to 42% of cases involving intestinal blockages. Efficient time management is crucial in the management of acute intestinal strangulation. The prognosis is more favorable when the diagnosis and intervention occur earlier. The determination of strangulation is contingent upon the comprehensive clinical assessment and the proficiency of the medical personnel conducting the examination. Serum lactate dehydrogenase and serum C-reactive protein are biomarkers that have demonstrated utility in the prediction of bowel gangrene in cases of intestinal obstruction [30-32].

### Conclusions

This study aimed to investigate the potential utility of a combination of raised serum C-reactive protein and D-lactate as biomarkers for predicting bowel gangrene in patients with intestinal obstruction. The study sample consisted of 50 patients who exhibited clinical indications of intestinal obstruction and strangling. The determination about the management of acute intestinal blockage should be predicated upon an assessment of diverse clinical, laboratory, and radiographic characteristics. The prompt and precise identification of the obstruction, together with its underlying cause, is crucial for the efficient treatment and favorable outcome. The clinical presentation, underlying causes, and prevalence of strangulation remain ambiguous, resulting in a lack of consensus regarding the optimal standard of management. The most severe consequence of the sickness is strangulation, which may necessitate an immediate intervention.

**Funding:** None.

**Conflict of Interest:** None.

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