



A Pilot Study to Determine the Prevalence of Occult Blood in Stool Among Mechanically Ventilated Sepsis Patients in a Tertiary Care ICU

Dr. Harsha Gupta¹, Dr. Shweta Gadekar², Dr. Vaibhav Gupta³, Dr. Shakti Singh⁴, Dr. Rajdeep Paul⁵

¹Associate Professor, Department of Anesthesiology, Chirayu Medical College & Hospital, Bhopal, M.P., email-harshagupta13@yahoo.com

²Assistant Professor, Department of Medicine, Chirayu Medical College & Hospital, Bhopal, M.P., email-drshwetaachauhan@gmail.com

³Senior Resident, Department of Medicine, Chirayu Medical College & Hospital, Bhopal, M.P., email-dr.vaibhav.afms@gmail.com,

⁴Assistant Professor, Department of Medicine, Chirayu Medical College & Hospital, Bhopal, M.P., email-shaktirajputssr@gmail.com

⁵Assistant Professor, Department of Microbiology, Chirayu Medical College & Hospital, Bhopal, M.P., email-rajdeepmicro20@gmail.com

Corresponding Author

Dr. Shakti Singh,

Assistant Professor, Department of Medicine, Chirayu Medical College & Hospital, Bhopal, M.P., email-shaktirajputssr@gmail.com

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Abstract

Introduction: Sepsis and mechanical ventilation can cause significant physiological stress leading to gastric mucosal damage and gastrointestinal bleeding. This study aims to assess the prevalence and risk factors for occult blood in stool among mechanically ventilated sepsis patients.

Aim & Objectives:

1. Assess the prevalence of occult blood in stool in sepsis patients receiving mechanical ventilation.
2. Determine the associated risk factors.

Methodology: A pilot observational study was conducted from June 1, 2019, to October 31, 2019, in the ICU of Chirayu Medical College. Included were sepsis patients aged 18-70 years on mechanical ventilation for more than 48 hours. Exclusions were patients with a history of gastrointestinal bleeding, ulceration, recent gastrointestinal surgery, or active bleeding. Demographic, clinical, and laboratory data were collected, and stool samples were tested for occult blood. Data analysis was performed using SPSS version 23.

Results: Among 129 patients, 76 (58%) tested positive for occult blood. Significant risk factors included hypertension ($P = 0.00001$), absence of sedation and analgesia ($P = 0.00001$), platelet count $<50,000$ ($P = 0.0007$), high mechanical ventilation settings ($P = 0.0004$), and raised PT/APTT ($P = 0.003$). Diabetes and chronic kidney disease were not significant.

Conclusion: There is a high prevalence of occult blood in stool among mechanically ventilated sepsis patients, with significant risk factors identified. Routine screening and proactive management are recommended to prevent gastrointestinal bleeding in this population. Further research is needed to confirm these findings and explore additional preventive strategies.

Introduction

Severe physiological stress can cause gastric mucosal damage, particularly in critically ill patients. Sepsis and mechanical ventilation are common stressors that exacerbate this condition. Although few studies have examined the incidence of gastrointestinal bleeding in mechanically ventilated patients, this study aims to assess the prevalence and risk factors associated with gastrointestinal bleeding in this population.

Aim & Objectives

1. To assess the prevalence of occult blood in stool in sepsis patients receiving mechanical ventilation.
2. To determine the risk factors associated with occult blood in stool in these patients.

Methodology

This pilot observational study was conducted in the Intensive Care Unit (ICU) of Chirayu Medical College from June 1, 2019, to October 31, 2019. The study aimed to assess the prevalence of occult blood in stool and identify associated risk factors in sepsis patients receiving mechanical ventilation. The inclusion criteria for the study were patients aged 18 to 70 years who were diagnosed with sepsis according to the Sepsis-3 definition and had been on mechanical ventilation for more than 48 hours. Patients were excluded if they were younger than 18 or older than 70 years, had a history of gastrointestinal bleeding, ulceration, or recent gastrointestinal surgery, or were admitted with active bleeding.

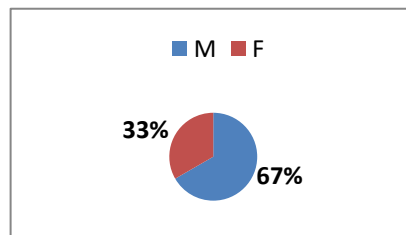
Demographic profiles and laboratory data were recorded for all patients meeting the inclusion criteria. Data on pre-existing illnesses such as hypertension, diabetes, and renal failure were collected. Additionally, PT and APTT times, platelet counts, mechanical ventilator settings, and the use of sedation and analgesia were noted. Stool samples were collected after 48 hours of mechanical ventilation and tested for occult blood using a guaiac-based fecal occult blood test (gFOBT). The collected data were analyzed using SPSS software (version 23) to determine the prevalence of occult blood in stool and to identify any statistically significant risk factors associated with gastrointestinal bleeding in the study population.

Results

The study included 129 sepsis patients receiving mechanical ventilation in the ICU of Chirayu Medical College from June 1, 2019, to October 31, 2019. The mean age of the study subjects was 48.5 years. The demographic and clinical characteristics of the patients are presented below.

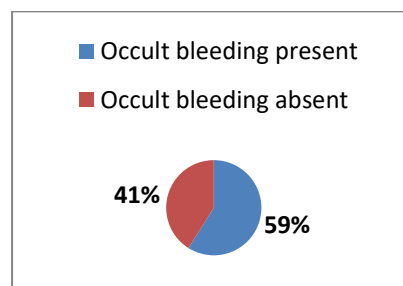
Demographics: - Mean age of study subjects: 48.5 years

- Sex distribution of admitted patients (n=129):



Prevalence:

- Proportion of admitted patients having gastrointestinal bleeding (n=129):



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Out of the 129 patients, 76 (58%) tested positive for occult blood in their stool samples, indicating a significant prevalence of gastrointestinal bleeding in this population.

Association of Risk Factors with Occult Bleeding (n=129):

Risk factors		Occult bleeding present (No. and %)	Occult bleeding absent (No. and %)	Total	X ²	P value
Hypertension	Present	68 (72)	26 (27)	94	25.79	0.00001
	Absent	08 (22)	27 (77)	35		
DM	Present	37 (61)	23 (38)	60	0.35	0.55
	Absent	39 (56)	30 (43)	69		
Sedation & analgesia	Present	31 (39)	48 (60)	79	32.9	0.00001
	Absent	45 (90)	5 (10)	50		
Platelets <50000	Present	31 (81)	07 (18)	38	11.43	0.0007
	Absent	45 (49)	46 (50)	91		
Mech. ventilation	Present	34 (80)	08 (19)	42	12.49	0.0004
	Absent	42 (48)	45 (51)	87		
CKD	Present	22 (57)	16 (42)	38	0.02	0.87
	Absent	54 (59)	37 (40)	91		
APTT/PT(raised)	Present	26 (81)	06 (18)	32	8.77	0.003
	Absent	50 (51)	47 (48)	97		
Total		76 (58)	53 (41)	129		

The analysis revealed several significant risk factors associated with the presence of occult blood in stool:

- **Hypertension:**
 - Present: 68 patients (72%) with occult bleeding
 - Absent: 8 patients (22%) with occult bleeding
- **P-value:** 0.00001, indicating a strong association
- **Diabetes Mellitus (DM):**
 - Present: 37 patients (61%) with occult bleeding
 - Absent: 39 patients (56%) with occult bleeding
 - **P-value:** 0.55, indicating no significant association
- **Sedation and Analgesia:**
 - Present: 31 patients (39%) with occult bleeding
 - Absent: 45 patients (90%) with occult bleeding
 - **P-value:** 0.00001, indicating a strong association
- **Platelet Count <50,000:**
 - Present: 31 patients (81%) with occult bleeding
 - Absent: 45 patients (49%) with occult bleeding
 - **P-value:** 0.0007, indicating a significant association
- **Mechanical Ventilation Settings:**
 - High settings: 34 patients (80%) with occult bleeding
 - Lower settings: 42 patients (48%) with occult bleeding
 - **P-value:** 0.0004, indicating a significant association
- **Chronic Kidney Disease (CKD):**
 - Present: 22 patients (57%) with occult bleeding
 - Absent: 54 patients (59%) with occult bleeding
 - **P-value:** 0.87, indicating no significant association
- **Raised PT/APTT:**
 - Present: 26 patients (81%) with occult bleeding
 - Absent: 50 patients (51%) with occult bleeding
 - **P-value:** 0.003, indicating a significant association

Discussion

The results of this pilot study indicate a significant prevalence of occult blood in stool among mechanically ventilated sepsis patients in a tertiary care ICU. The findings underscore the critical nature of stress-related mucosal damage in this patient population, necessitating heightened awareness and proactive management to mitigate gastrointestinal bleeding risks. The prevalence rate observed in this study aligns with previous research, which has documented high rates of gastrointestinal complications among critically ill patients. For instance, Faisy et al. (2003) noted a substantial incidence of gastrointestinal bleeding in ICU patients, even with stress-ulcer prophylaxis. Our study reinforces these findings, highlighting the ongoing vulnerability of mechanically ventilated sepsis patients to occult gastrointestinal bleeding despite modern medical interventions.

Several risk factors were significantly associated with the presence of occult blood in stool. Hypertension emerged as a prominent risk factor, with hypertensive patients exhibiting a markedly higher incidence of gastrointestinal bleeding. This association is likely due to the compounded physiological stress from both sepsis and elevated blood pressure, exacerbating mucosal injury.

The mechanical ventilation settings were also significantly correlated with occult bleeding. Patients subjected to higher ventilator pressures were more prone to gastrointestinal complications. This finding supports the hypothesis that the increased intrathoracic pressure associated with mechanical ventilation can contribute to decreased splanchnic perfusion, leading to mucosal ischemia and subsequent bleeding.

Interestingly, the absence of sedation and analgesia was strongly associated with a higher prevalence of occult blood in stool. This counterintuitive finding suggests that the physiological stress response, exacerbated by pain and agitation in unsedated patients, may play a crucial role in mucosal injury. This emphasizes the importance of adequate sedation and analgesia in the management of mechanically ventilated patients to reduce stress-induced gastrointestinal complications.

Other significant risk factors included raised PT/APTT and thrombocytopenia (platelet count <50,000). These hematological abnormalities are well-documented contributors to bleeding risks, corroborating previous studies (Kahn et al., 2006; Spirt, 2004). Raised PT/APTT indicates a coagulopathy, which, coupled with a low platelet count, significantly impairs the body's ability to form stable clots, thereby increasing the likelihood of mucosal bleeding. Contrary to expectations, diabetes mellitus and chronic kidney disease (CKD) were not significantly associated with occult bleeding in our study. While these conditions are known to exacerbate critical illness outcomes, their specific impact on gastrointestinal bleeding may be overshadowed by more direct factors such as mechanical ventilation settings and coagulopathy.

The findings of this study have several clinical implications. First, routine screening for occult blood in stool should be considered for mechanically ventilated sepsis patients, particularly those with identified risk factors. Early detection of occult bleeding can prompt timely interventions, potentially reducing the morbidity associated with overt gastrointestinal hemorrhage.

Second, strategies to mitigate identified risk factors should be implemented. Optimizing mechanical ventilator settings to minimize intrathoracic pressure, ensuring adequate sedation and analgesia, and managing coagulopathies through appropriate medical interventions are essential steps in reducing the risk of stress-related mucosal injury and bleeding.

Limitations

This study has several limitations. The pilot nature and single-center design limit the generalizability of the findings. A larger, multicenter study would provide more robust data and potentially reveal additional risk factors. Additionally, the study's observational design precludes establishing causality, although the associations identified are clinically significant.

Conclusion

In conclusion, this study highlights the high prevalence of occult blood in stool among mechanically ventilated sepsis patients and identifies key risk factors such as hypertension, high mechanical ventilator settings, absence of sedation and analgesia, raised PT/APTT, and thrombocytopenia. These findings underscore the need for routine screening and proactive management to prevent gastrointestinal bleeding in this vulnerable patient population. Further research is warranted to confirm these findings and explore additional strategies for mitigating the risk of stress-related mucosal injury in critically ill patients.

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