International Journal of Sciences & Applied Research

www.ijsar.in

BEHIND THE STITCHES: UNRAVELLING THE INCIDENCE, COMORBIDITIES AND OTHER RISK FACTORS OF ABDOMINAL SURGICAL SITE INFECTIONS AMONG EMERGENCY POSTOPERATIVE PATIENTS IN A TERTIARY CARE HOSPITAL NORTH INDIA.

Sharma Komal Devi[1], **KumariManisha**[2], **Sood Anuradha**[2], **Kaur Isampreet**[3], **Rana Aditya**[4]

[1]Junior resident Department of Microbiology, Dr.R.P.Govt.Medical college Kangra at Tanda.
[2]Junior resident Department of Microbiology, Dr.R.P.Govt.Medical college Kangra at Tanda
Professor and Head Department of Microbiology, Dr.R.P.Govt.Medical college Kangra at Tanda
[3]Assistant professorDepartment of Microbiology, Dr.R.P.Govt.Medical college Kangra at Tanda
4Senior resident Department of Microbiology, Dr.R.P.Govt.Medical college Kangra at Tanda
∗**Jaryal Subhash Chand** (**Corresponding author**) Professor Department of Microbiology M.M.C.MSR Sadopur Ambala ,Haryana.

ABSTRACT

Introduction: Surgical site infections (SSIs) remain a global challenge, affecting 14–16% of hospitalized patients. They can arise from endogenous skin flora or exogenous sources among high-risk patients (e.g., diabetes, anaemia, malnutrition and smoking). This study explores SSI incidence, risk factors, and microbiological profiles in emergency abdominal surgeries at Dr. RPGMC Tanda in North India.

Material and method: A retrospective analysis was conducted between April 2023 and March 2024 at Dr. RPGMC Kangra at Tanda. Patients undergoing emergency abdominal surgeries who developed postoperative wound infections within seven days were included, following strictly predefined inclusion and exclusion criteria. A proforma captured demographic and clinical details. Swabs were aseptically collected upon infection detection and again 72 hours later. Samples underwent direct microscopy, culture, biochemical testing, and antibiotic susceptibility assessment according to stringent standard laboratory procedures.

Results: Among 751 emergency surgical patients, 113 (15.04%) developed surgical site infections (SSIs). Males accounted for 58.4% of infections, whereas 41.6% involved females. Individuals older than 60 years recorded the highest incidence (33.3%). Of the 113 patients with SSIs, 37 (32.7%) presented no comorbidities. However, most patients exhibited one or more risk factors, particularly anemia (57%) and diabetes mellitus (55.4%), followed by smoking (28%), hypertension (10.6%), and COPD (1.8%). These findings underscore the substantial SSI burden and the significance of comorbidities in elevating infection risk, reinforcing the necessity for targeted preventive strategies and vigilant postoperative care. Robust prophylactic interventions remain warranted.

Discussion: Postoperative wound infections remain a significant concern after emergency abdominal surgeries. In this study, 15.4% developed SSIs, aligning with previous findings. Males were more affected (58.4%) than females (41.6%). Anaemia (57%) and diabetes

(55.4%) dominated comorbidities, underscoring meticulous risk evaluation, glycaemic control, and early intervention for optimal outcomes and care.

Keywords: SSI, Postoperative wound infections, Emergency abdominal surgery, Risk Factors, AST.

INTRODUCTION

Postoperative wound infections (surgical site infections, SSIs) remain prevalent worldwide, affecting 14–16% of hospitalized patients [1].Surgical site infection as defined by CDC as infection occurring within 30 days of surgery or within 90 days if an implant is involved [2]. Potential source of infection could be endogenous sources, such as the patient's skin flora or exogenous sources like unsterilized instruments or the hands of healthcare personnel.Multiple risk factors contribute to SSIs are microbial factors include the bacterial load—exceeding 10^5 organisms per gram of tissue increases infection risk [3]and the inherent virulence of specific pathogens. Antibiotic-resistant bacteria further complicate management by evading conventional treatments. Patient factors such as advanced age, inadequate nutrition, diabetes, smoking, malignancy, on immunosuppressive drugs and peripheral vascular disease can also predispose to infection [4].Prolonged hospital stays and colonization with resistant organisms elevate risk as well. Perioperative variables, including long surgery duration, suboptimal surgical technique, and emergency procedures, are also implicated [5]. In addition, perioperative hypothermia has been linked to impaired immune function, compromising the body's defences[6].Strict infection control includes thorough preoperative preparation, proper surgical scrubbing, sterilized instruments, timely antibioticsand short preoperative stays. Adhering to aseptic protocols, host factorsand environmental sanitation reduces SSI burden.Early identification of high-risk individuals, including those with diabetes or malnutrition, facilitates prompt, tailored interventions to prevent surgical site infections (SSI). This study addressed the previously unexplored incidence, risk factors, and microbiological profiles of SSI among emergency abdominal surgery patients at DR RPGMC Tanda, guiding antibiotic sensitivity and improving outcomes.

MATERIAL AND METHOD

A retrospective analysis of incidence and risk factors among patients undergoing emergency abdominal surgery was performed at the Department of Microbiology at Dr.RPGMC Kangra at Tanda over a period of 1 year i.e. from April, 2023 to March, 2024.The study population included all cases having postoperative wound infections within 7 days of operation, who have undergone emergency abdominal surgeries in Department of Surgery (DRPGMC) who fulfilled the inclusion criteria. A proforma was prepared for demographic and clinical details from all those who give consent for participation.

Clinical data

The Clinical data of all patients included in the study was collected and recorded.

Collection of specimens

Swabs from surgical site were collected taking all aseptic measures as follows:
Surgical site area was wiped with sterile normal saline (0.9%).
Two sterile cotton tipped swabs moistened with sterile saline were collected by gently rolling over the surface of wound approximately 5 times, focusing on the area where evidence of pus or inflamed tissue was present.[7]
First sample was collected when patient develop signs of infection or inflammation, 2nd sample was collected 72 hours after collection of first sample. Samples were collected and processed as per standard protocols.

Inclusion criteria: The inclusion for patients for this study was done on the following criteria:

1. Patients of both sexes.
2. Patients undergoing emergency abdominal surgeries in Department of Surgery, DRPGMC Kangra at Tanda.
3. Patients having signs and symptoms of postoperative wound infections within 7 days of surgery.
4. Patients giving informed consent to participate in the study.

Exclusion criteria: The exclusion for patients for this study was done on the following criteria:

1. Patients undergoing elective surgeries.
2. Patients who are not giving informed consent to participate in study.
3. Patients in whom second sample could not be collected because of any reason.

Transportation and storage of specimens

All samples were collected in suitable, clearly labelled, sterile swabs containers. It was transported immediately to microbiology laboratory. If anticipated delay; the sample was stored at room temperature up to 24 hours.

Sample processing

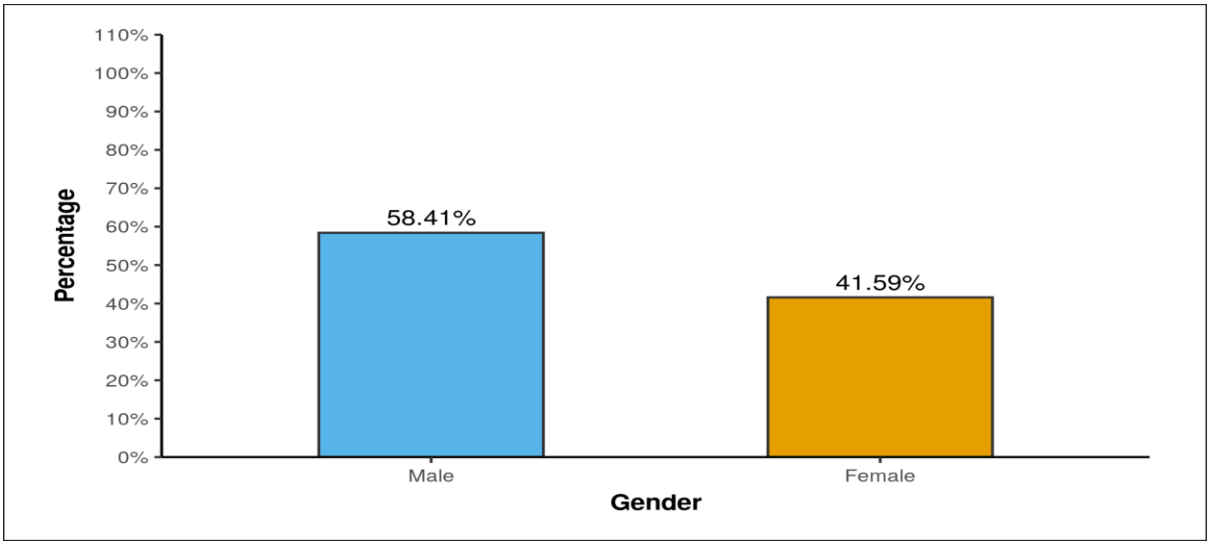
The samples were processed in the microbiology lab following standard microbiological procedure which includes the following:

1. Direct microscopic examination.
2. Inoculation on different culture media.
3. Preliminary identification of the growth by studying colony characteristics and bio-chemical tests.
4. Antimicrobial susceptibility testing.

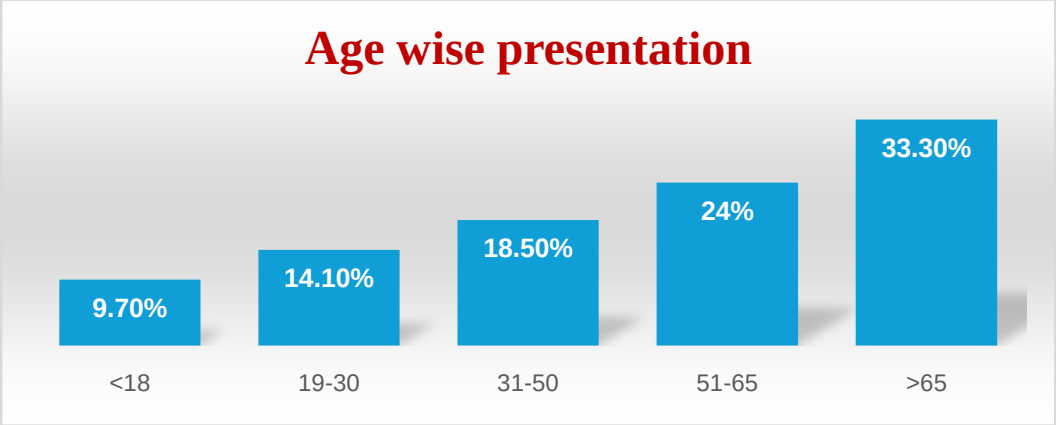
RESULTS

Out of 751 patients who underwent emergency surgery 113 developed surgical site infections. So, the incidence was found to be 15.04%.

The incidence of SSI among male was 58.4%, whereas the incidence among females was 41.6%.

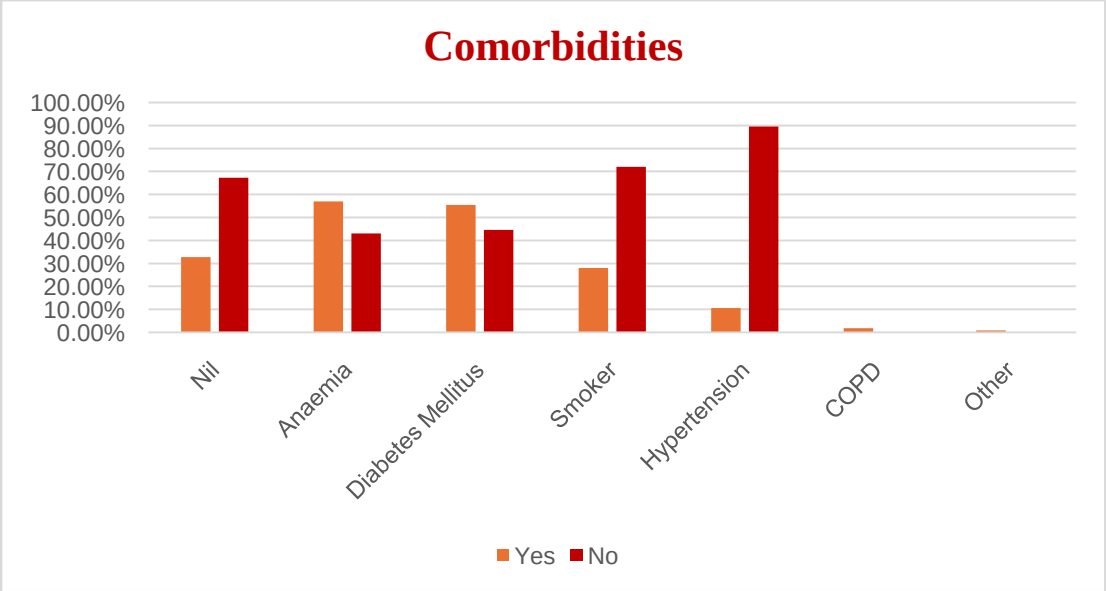


Patients more than 60 years of age showed highest incidence of surgical site infections (33.3%) compared to patients in other age groups.



In our study, out of 113 patients who developed post operative surgical site infections37(32.7%)patients showed no comorbidities. More than one risk factors co-exist in most of the patients. Patients who had anaemia were 53 accounts for 47%, Diabetes mellitus was most common co-morbidity accounts for (50.4%) followed by smoking (28%) and hypertension (10.6%). Two patients had history of COPD accounts for (1.8%.). Hence, the risk factors among patients developing post-operative surgical site infections were considerably higher in this study.

Sr.no	Comorbidity	Percentage%
1	Nil	32.7%
2.	Anaemia	57%
3	Diabetes Mellitus	55.4%
4	Smoker	28%
5	Hypertension	10.6%
6	COPD	1.8%
7	Other	0.9%



DISCUSSION

Postoperative wound infections, or surgical site infections, pose a major threat after emergency abdominal surgeries.. Suboptimal patient factors, including comorbidities, further exacerbate vulnerability. Targeted preventive measures and early detection remain essential in mitigating associated morbidity and mortality. The present study, was conducted in Department of Microbiology in collaboration with Department of Surgery at Dr. RPGMC Kangra at Tanda over a one-year period w.e.f April, 2023 to March, 2024. This study reveals the incidence of postoperative wound infections to be 15.4% in patients undergoing emergency surgeries. These findings are in concordance with the study done by Kumar A et al who showed the frequency of surgical site wound infections after emergency surgeries to be 17.7%.Frequency of wound infections in our study was more in males (58.4%) as compare to females(41.6%). The male to female ratio was 1.4:1. This is comparable to the findings by Mohan N et al and Omar A et al as these reported higher incidence of postoperative wound infections in males as compare to females in their studies .[8,9]

Several factors could contribute to the higher prevalence of infections in males as compared to females, primarily the androgens in males have proinflammatory effect which lead to delayed wound healing in contrast estrogen in females have anti-inflammatory effect.[92]Another factor is that men are often more involved in high-risk behaviours and occupations that lead to injuries requiring emergency surgical intervention.

Out of 113 patients in this study, 37(32.7%) patients had co-morbidities. Anaemia was the most common co-morbidity presented in (57%) of the cases, followed by Diabetes mellitus (55.4%). A study conducted by White MC et al showed that preoperative anaemia increases the risk of post operative complication [10]. Another study conducted by Maiti S, Akhtar S et al in 2021 reported prevalence of diabetes mellitus in Indian population to be 16.1%[9]which is far greater than that reported from various parts of the world.

A study conducted by Trrisha V et al showed that (36%)of the cases had diabetes mellitus as a risk factor followed by smoking in (10%) of the cases.[11]

Similar observations were depicted by Tripathi P et al and Bhatiani A et al in their analysis which showed that diabetes mellitus was the most common risk factor associated with wound infections.[12,13]

Risk factors like diabetes mellitus, anaemia and smoking etc, affect the wound outcome by impairing immune function and delaying of wound healing. Further, these finding suggest the need for meticulous preoperative screening for risk factors before surgeries are done.

CONCLUSION

This study emphasizes the considerable incidence (15.4%) of postoperative wound infections following emergency abdominal surgeries and highlights the role of comorbidities, particularly anaemia and diabetes mellitus, in elevating infection risk. The higher prevalence in males may relate to inflammatory responses and risk-prone lifestyles. Strengthening preoperative screening and optimizing patient status could potentially reduce these infections. Adopting targeted preventive strategies, such as glycemic control, nutritional support, and behavioural modifications, alongside timely diagnosis and treatment, can mitigate complications. Ultimately, comprehensive risk assessment also remains pivotal for improving surgical outcomes and reducing morbidity and healthcare costs. Therefore, large-scale research is warranted.

BIBLIOGRAPHY

1.Saravanakumar R, Devi BMP. Surgical site infection in a tertiary care centre-an overview - A cross sectional study. International Journal of Surgery Open. 2019 Jan 1;21:12–6.

2.Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Grace Emori T. CDC definitions of nosocomial surgical site infections, 1992: A modification of CDC definitions of surgical wound infections. AJIC: American Journal of Infection Control. 1992;20(5):271–4.

3. JAMES RC, MACLEOD CJ. Induction of staphylococcal infections in mice with small inocula introduced on sutures. Br J Exp Pathol. 1961 Jun 1;42:266–77.

4.Mangram AJ, Horan TC, Pearson ML, Christine Silver L, Jarvis WR, Larson EL, et al. Guideline for the prevention of surgical site infection, 1999. Bull Am Coll Surg .1999;20(7):23–9.

5. Study of surgical site infections in abdominal surgeries 935 surgery section satyanarayana v., prashanthh.v., basavarajbhandare, kavyashreea.n. - Google Search [Internet]. [cited 2024 May 4]. Available from: 8

6.Theses N, Projects C, Anders KC. Preprocedure Warming to Prevent Intraoperative Hypothermia. 2016 ; 250.

7. Standard Operating Procedures in Bacteriology. Clin Microbiol Rev. 2024;15(2):78-85

8. Mohan N, Gnanasekar D, TK S, Ignatious A, Mohan N, Gnanasekar D, et al. Prevalence and Risk Factors of Surgical Site Infections in a Teaching Medical College in the Trichy District of India. Cureus [Internet]. 2023 May ;15(5).

9.Marzoug OA, Anees A, Malik EM. Assessment of risk factors associated with surgical site infection following abdominal surgery: a systematic review. BMJ SurgInterv Health Technol [Internet]. 2023 Jul;5(1).

10. White MC, Longstaff L, Lai PS. Effect of Pre-operative Anaemia on Post-operative Complications in Low-Resource Settings. World J Surg. 2017 Mar;41(3):644-649.

11.Maiti S, Akhtar S, Upadhyay AK, Mohanty SK. Socioeconomic inequality in awareness, treatment and control of diabetes among adults in India: Evidence from National Family Health Survey of India (NFHS), 2019–2021. Scientific Reports 2023 13:1 . 2023 Feb;13(1):1–12.

12.Bhatiani A, Tiwari R, Hasan Mohd S, Afaq N, Narang A, Parveen S, et al. To study the prevalence and risk factors of surgical site infections of patients at a tertiary care centre, Uttar Pradesh, India. J PopulTher Clin Pharmacol. 2023 Oct 23;30(18):908-917.

13.Tripathi P, Shandilaya U, Yadav D, Jialdasani R. Clinical study of various risk factors associated with surgical site infection at a tertiary hospital. Hosp Infect Control. 2024;41(2):154-162.