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The Incidence and Risk Factors for Surgical Site Infection: A Prospective Cohort Study

Lopa Patel[*1,2], Arjun Chauhan[1,2], Anha Ashai [1], Surene De Fatima Basilio Corage [1], Chhayankaben Rathwa[1,2], Anjali Chauhan[1,2]

[1]Parul Institute of Paramedical and Health Sciences, Parul University, Limda, Waghodia Vadodara-391760, Gujarat.

[2]Parul Institute of Nursing, Parul University, Limda, Waghodia, Vadodara - 391760, Gujarat

***Corresponding Author:**

Lopa Patel

Parul Institute of Paramedical and Health Sciences, Parul University, Limda, Waghodia Vadodara-391760, Gujarat.

Email ID: lopa.patel2037@paruluniversity.ac.in

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ABSTRACT

Background: Surgical site infections (SSIs) are a major cause of postoperative morbidity in orthopaedic surgery, particularly in low-resource settings. Identifying risk factors associated with SSIs is critical for improving patient outcomes and guiding infection control strategies.

Objective: To determine the incidence and explore risk factors contributing to SSIs among orthopaedic patients undergoing surgery at Parul Sevashram Hospital, Vadodara, Gujarat.

Methods: A prospective cohort study was conducted on 100 patients aged ≥18 years who underwent orthopaedic surgery between July 2022 and July 2023. Data on demographic, preoperative, intraoperative, and postoperative factors were collected using a structured tool. Statistical analysis was performed using SPSS version 25. Chi-square tests were used to determine associations between variables and SSIs.

Results: The overall incidence of SSIs was 13%. Significant demographic risk factors included age (p=0.038), education level (p=0.023), rural residence (p=0.025), and alcohol consumption (p=0.005). Preoperative factors such as trauma (p=0.001) and deformity (p=0.029) were significantly associated with SSIs. Among intraoperative factors, the surgical site (upper vs. lower limb) showed a significant association (p=0.011). Postoperative factors, including drain fluid volume (p=0.001), number of drainage days (p=0.001), and length of hospital stay (p=0.002), were also significantly associated with SSIs.

Conclusion: The study identified a relatively high incidence of SSIs and several associated risk factors in orthopaedic patients. Targeted interventions focusing on modifiable factors—particularly in the preoperative and postoperative phases—are essential to reduce infection rates and improve surgical outcomes.

Keywords: *Surgical site infection, orthopaedic surgery, risk factors, incidence, postoperative care, infection control.*

1. INTRODUCTION

Surgical site infections (SSIs) are defined as infections that occur at the site of a surgical incision within 30 days of surgery or within one year if an implant is in place. In orthopaedic surgery, SSIs are particularly concerning due to the frequent use of internal fixation devices and implants, which increase susceptibility to infection. These infections significantly impact patient outcomes by increasing hospital stays, morbidity, and mortality, while also imposing a financial burden on healthcare systems.

SSIs are among the most common healthcare-associated infections, second only to urinary tract infections. The prevalence of SSIs ranges from less than 1% in developed countries to more than 20% in certain high-risk procedures and low-resource settings. In India, the incidence is relatively high, particularly in public hospitals with limited resources.

Several risk factors contribute to SSIs, including patient-related variables (e.g., age, comorbidities, nutrition, lifestyle), procedural factors (e.g., surgical duration, implant use, hygiene protocols), and postoperative issues (e.g., wound care,

drainage, length of hospital stay). In orthopaedics, the nature of interventions involving open wounds, hardware, and prolonged immobilization further increases the infection risk.

This study aimed to determine the incidence and explore the risk factors associated with SSIs in orthopaedic patients at Vadodara, Gujarat. It assessed demographic, preoperative, intraoperative, and postoperative variables to provide evidence that may improve infection prevention strategies.

2. MATERIALS AND METHODS

A prospective cohort study was conducted from July 2022 to July 2023 at Vadodara. The study included 100 patients aged 18 years and above who underwent orthopaedic surgery. Participants were selected using predefined inclusion criteria and provided informed consent. Data were collected through direct interviews and reviews of clinical records.

A structured two-part data collection tool was used. Part one collected demographic details and patient-related predisposing factors. Part two assessed preoperative, intraoperative, and postoperative risk factors. The tool was developed based on previously validated instruments.

All surgeries were conducted under standard aseptic conditions, including the use of personal protective equipment, proper surgical hand hygiene, and ventilation protocols. Data analysis was performed using SPSS version 25. Descriptive statistics (frequency, percentage) and inferential statistics (Chi-square test) were applied to assess associations between risk factors and the occurrence of SSIs.

3. RESULTS

Among the 100 patients, the largest age group was >45 years (48%). Males represented 70% of the cohort. Most participants were married (93%), lived in rural areas (96%), and did not consume alcohol (97%).

The overall incidence of SSIs was 13%. Significant associations were found between SSIs and the following demographic variables:

- Age (p = 0.038)
- Educational status (p = 0.023)
- Residence (p = 0.025)
- Alcohol consumption (p = 0.005)

Table 1: Association between incidence of surgical site infection among orthopaedic surgical patient with their selected demographic variables.

Demographic variables		Frequency	Percentage	Incidence		χ^2 ςαλυε	df	p value
				Yes	No			
1. Age in years	a. 18-25	8	8	2	6	8.39	3	0.038*
	b. 26-35	18	18	1	17			
	c. 36-4	26	26	0	26			
	d. > 45	48	48	10	38			
2. Gender	a. Male	70	70	8	62	0.509	1	0.475^{NS}
	b. Female	30	30	5	25			
3. Marital status	a. Single	7	7	1	6	0.011	1	0.916^{NS}
	b. Married	93	93	12	81			
	c. Divorced	0	0	--	--			
	d. Widow	0	0	--	--			
4. Educational status	a. Cannot read and write	31	31	9	22	9.531	3	0.023*
	b. Primary	28	28	3	26			

	c. Secondary	33	33	1	32			
	d. College/university	8	8	1	7			
5. Occupation	a. Housewife	29	29	5	24	2.807	3	0.422^{NS}
	b. Farmer	35	35	6	29			
	c. Daily labour	22	22	1	21			
	d. Other	14	14	1	13			
6. Residence	a. Rural	96	96	11	85	5.043	1	0.025*
	b. Urban	4	4	2	2			
7.Herbal medicine	a. Yes	3	3	1	2	1.131	1	0.288^{NS}
	b. No	97	97	12	85			
8. Alcohol consumption	a. Yes	3	3	2	1	7.876	1	0.005*
	b. No	97	97	11	86			

Preoperative Risk Factors:

- Trauma (p = 0.001) and deformity (p = 0.029) were significantly associated with SSIs.
- BMI, ASA classification, arthroplasty, and malignancy were not significantly associated.

Table 2: Association between incidence of surgical site infection and Preoperative risk factors among orthopaedic surgical patient

Preoperative risk factors		**Frequency**	**Percentage**	**Incidence**		χ^2 ϖαλυε	**Df**	**p value**
				Yes	**No**			
1. BMI	a. ≤ 25	13	13	2	11	0.075	1	0.784^{NS}
	b. > 25	87	87	11	76			
2. ASA code	a. Grade 1 and 2	100	100	13	87	NA	NA	NA
	b. Grade 3 and 4	0	0	--	--			
3. Trauma	a. Yes	38	38	10	28	9.609	1	0.001*
	b. No	62	62	3	59			
4. Arthroplasty	a. Yes	5	5	1	4	0.228	1	0.633^{NS}
	b. No	95	95	12	83			
5. Deformity	a. Yes	4	4	2	2	4.739	1	0.029*
	b. No	96	96	11	81			
6. Malignance	a. Yes	4	4	0	4	0.623	1	0.430^{NS}
	b. No	96	96	13	83			

Intraoperative Risk Factors:

- The site of operation (upper vs. lower limb) showed a significant association (p = 0.011).
- No significant associations were observed for method of hair removal, number of assistants, C-arm use, fracture table,

urinary catheterization, or blood transfusion.

Table 3: Association between incidence of surgical site infection and Intraoperative risk factors among orthopaedic surgical patient

Intraoperative risk factors		Frequency	Percentage	Incidence		χ^2 παλυε	Df	p value
				Yes	No			
1. Method of hair removal	a. Shaving	100	100	13	87	NA	NA	NA
	b. Clipping	0	0	--	--			
	c. Chemical depilation	0	0	--	--			
2. No of assistants	a. ≥ 3	3	3	0	3	0.46	1	0.497NS
	b. < 3	97	97	13	84			
3. Use of C-Arm	a. Yes	98	98	12	86	2.47	1	0.116NS
	b. No	2	2	1	1			
4. Use of fracture OT table	a. Yes	99	99	13	86	0.15	1	0.698NS
	b. No	1	1	0	1			
5. Use of urinary catheter	a. Yes	88	88	11	77	0.16	1	0.687NS
	b. No	12	12	2	10			
6. Blood transfusion	a. Yes	3	3	0	3	0.46	1	0.497NS
	b. No	97	97	13	84			
7. Operation site	a. Upper limb	48	48	2	46	6.37	1	**0.011***
	b. Lower limb	52	52	11	41			

Postoperative Risk Factors:

- Significant associations were observed with:
  - Volume of drain fluid (p = 0.001)
  - Number of drainage days (p = 0.001)
  - Duration of hospital stay (p = 0.002)
- Fasting blood sugar levels and surgery duration were not significantly associated with SSIs.

Table 4: Association between incidence of surgical site infection and Postoperative risk factors among orthopaedic surgical patient

Postoperative risk factors		Frequency	Percentage	Incidence		χ^2 παλυε	Df	p value
				Yes	No			
1. Post-operative (FBS-mg/dl)	a. > 110	14	14	4	10	3.49	1	0.062^{NS}
	b. < 110	86	86	9	77			
2. Amount collection (drain)	a. ≥ 170	8	8	4	1	20.4	1	0.001*
	b. < 170	92	92	9	84			
3. No day (drain)	a. > 2	5	5	3	2	10.3	1	0.001*

	b. < 2	95	95	10	85			
4. Duration of stay in days	a. > 18	2	2	2	0	13.7	1	0.002*
	b. < 18	98	98	11	87			
5. Duration of surgery in hours	a. > 3	1	1	0	1	0.15	1	0.698^{NS}
	b. < 3	99	99	13	86			

Table 5: Incidence of surgical site infection among orthopaedic surgical patient

Incidence	Frequency	Percentage
Yes	13	13
No	87	87

Above table shows that out of 100 patient's incidence of surgical site infection among orthopaedic surgical patient was found to be 13%.

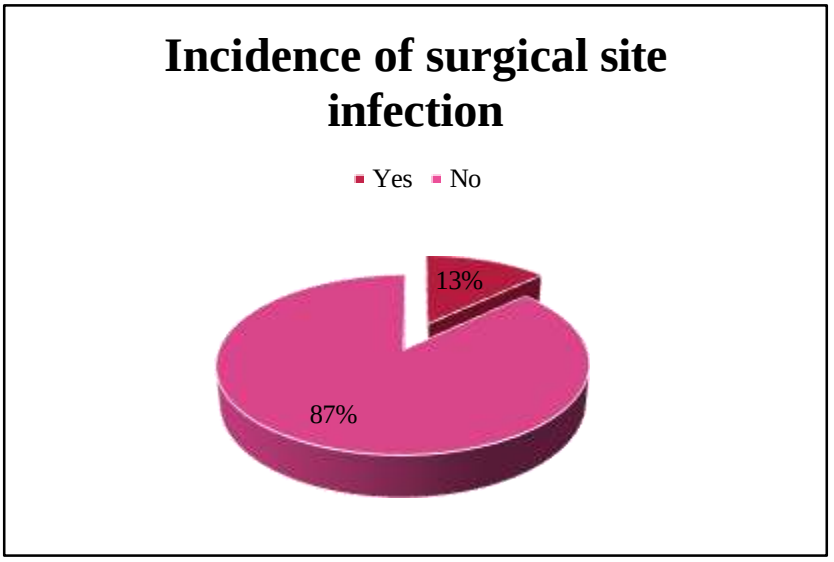

Fig 1: Incidence of surgical site infection among orthopaedic surgical patient

4. DISCUSSION

The incidence of SSIs in this study was 13%, higher than in many developed nations but consistent with reports from other Indian tertiary care hospitals. Demographic factors, including age, educational level, rural residence, and alcohol consumption, were associated with an increased risk of infection. Clinically, trauma and deformity were significant preoperative predictors, while operation site, drain characteristics, and longer hospital stays were notable intra- and postoperative contributors.

These findings reinforce the multifactorial etiology of SSIs. Effective prevention strategies should target modifiable risk factors through optimized preoperative preparation, strict intraoperative asepsis, and diligent postoperative care.

5. CONCLUSION

The study identified a 13% incidence of SSIs among orthopaedic surgery patients at Parul Sevashram Hospital. Significant risk factors included age, education, rural residence, alcohol use, trauma, deformity, operative site, drainage parameters, and hospital stay length. These insights can inform targeted infection control measures and institutional policy improvements.

Conflicts of Interest: The authors declare no conflicts of interest.

Source of Funding: Self-funded.

Ethical Considerations: The study received ethical clearance from the Parul Institutional Ethics Committee for Human Research (PU-IECHR). Patient confidentiality and data privacy were maintained throughout the study.

REFERENCES

[1] Mardanpour, K., Rahbar, M., Mardanpour, S. and Mardanpour, N., 2017. Surgical site infections in orthopaedic surgery: incidence and risk factors at an Iranian teaching hospital. Clinical Trials in Orthopaedic Disorders, 2(4), p.132.

[2] Mohammed P, A., Sharma, D., Patro, D. K., Menon, J. and Poduval, M. (2015) "A study of incidence and risk factors of Surgical site infection following orthopaedic surgical procedure in a tertiary care hospital in south India", International Journal of Medical Research and Review, 3(9), pp. 983-989. doi: 10.17511/ijmrr.2015.i9.182.

[3] Anwar, M., Reizian, A.E., El Kholy, A.M. et al. An Assessment Scale for Patients with Postoperative Superficial Incisional Surgical Site Infection: a Cross-Sectional Study. Indian J Surg 80, 259–268 (2018).

[4] Zabaglo M, Sharman T. Postoperative Wound Infection. [Updated 2022 Sep 19]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023.

[5] Evans, R. P. (2009). Surgical Site Infection Prevention and Control: An Emerging Paradigm. The Journal of Bone and Joint Surgery-American Volume, 91(Suppl 6), 2–9.

[6] Amaradeep, G., Prakah, S., & Manjappa, C.N. (2017). Surgical site infections in orthopaedic implant surgery and its risk factors: A prospective study in teaching hospital. International Journal of Orthopaedics Sciences, 3(3), 169-72.

[7] Mohammed, P. A., Sharma, D., Patro, D. K., Menon, J., & Poduval, M. (2015). A study of incidence and risk factors of Surgical site infection following orthopaedic surgical procedure in a tertiary care hospital in south India. IJMRR, 3(9), 983-989.

[8] Najjar, Y. W., et al. (2018). Risk factors of orthopaedic surgical site infection in Jordan: A prospective cohort study. International Journal of Surgery Open, 15, 1–6.

[9] Maksimović, J., et al. (2008). Surgical Site Infections in Orthopaedic Patients: Prospective Cohort Study. Croatian Medical Journal, 49(1), 58–65.

[10] Greene, L. R. (2012). Guide to the elimination of orthopaedic surgery surgical site infections. American Journal of Infection Control, 40(4), 384–386.