

**How to Cite:**

Singh, T., Tiwari, M. S., Kumar, R., & Sharma, A. (2022). A microbiological study of surgical infections in tertiary care hospital of Rewa District. *International Journal of Health Sciences*, 6(S2), 5735–5739. <https://doi.org/10.53730/ijhs.v6nS2.6448>

# **A microbiological study of surgical infections in tertiary care hospital of Rewa District**

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**Abstract**---Most common involvement of aerobes and anaerobes is observed in surgical infections. They are mostly polymicrobial. 52 cases comprised of abscesses and study of 19 cases with wounds having devitalized tissues was done. Abscess had highest microorganism, which were isolated per lesion. The ratio of aerobe to anaerobe was 8.6 and 5.5 in group A and group B respectively. Predominant aerobes were *S. aureus* and *E coli* while predominant anaerobes were *Bacteroides fragilis* and *Peptostreptococcus anaerobius*. Surgical Infection are more with contaminated surgical wound than clean surgical wound. Commonly *E. coli* and *S aureus* were causing surgical infections. Better understanding of these microbiological pathogens was seen in present study which has therapeutic and epidemiological implications. To conduct further research this study can act as pilot study.

**Keywords**---abscess, surgical infections, contaminated, wounds, devitalized tissue.

**Introduction**

Microbiological assessment helps to study the causes of non healing surgical infections. There are various pathogens and group of microorganisms that should be routinely detected and reported. These are *Staphylococcus aureus*, *Pseudomonas aeruginosa*, □ hemolytic streptococci, coliform bacteria, pigmented Gramnegative anaerobes (*Prevotella* and *Porphyromonas* spp.) non - pigmented

Gram-negative anaerobes (primarily *Bacteroides*, *Prevotella* and *Fusobacterium* spp.), *Peptostreptococcus* spp., and *Clostridium* spp. [1].

Contamination is defined as microbiological introduction in previous sterile site as wound. Bacteria present in tissue of these wound have hostile environment. In open wound it is observed that bacterial flora is rarely static, newer organisms are seen and old ones disappear. [2] Influence of microorganisms in process of wound healing is studied elaborately, most of them are polymicrobial. Delayed healing and rise in infection is caused by these pathogens [1]. Role of anaerobes and aerobes is investigated in abscesses and wounds with devitalized tissue in this study, so that proper antimicrobial therapy could be determined.

### **Material and Methods**

The study was done at SSMC and Sanjay Gandhi Hospital, Rewa (MP) from January 2019 to January 2020. The study group comprised of:

- Group A-Abscess group (closed abscesses either single or multiple with redness & brownish induration at periphery)
- Group B-Wounds with devitalized tissue (gangrenous tissue with no sensation and no blood supply with blackened affected organ having foul smell or odour.)

Collection of specimen was done from skin/mucus membranes which were decontaminated using alcohol/povidone iodine. They were purulent exudate which were aspirated from abscesses & devitalized gangrenous tissue. Collection of specimen was done in cooked meat broth for anaerobic culture. They were incubated at 37°C for 48 hours. 5% sheep blood agar, MacConkey agar, 7% salt agar and chocolate agar were used for aerobic incubation. The media used for anaerobic incubation were Brain Heart Infusion agar (BHI), neomycin BHI agar, *Bacteroides* Bile esculin agar. Anaerobic incubation was done with *P. aeruginosa* as a biological indicator and alkaline methylene blue glucose as a chemical indicator. For identification of aerobes standard microbiological methods were used [3] & anaerobes were processed according to Wadsworth Anaerobic Bacteriology Manual [4].

### **Results**

Out of 70 cases, 52 were closed abscesses and were included in Group A while 18 had devitalized tissue which were included in Group B. 9 of them were sterile. Culture positivity was observed to be 82% and 75% in groups A and B respectively. Organisms isolated per lesion were more in Group A which was followed by group B. In group A 36.4% had polymicrobial nature of infection, while group B had 29.4% polymicrobial nature of infection.

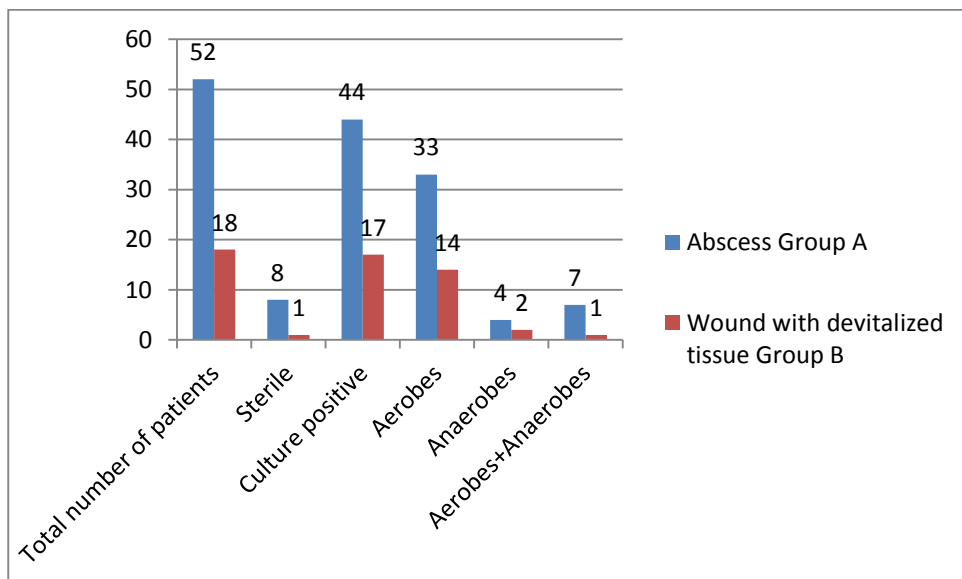
Aerobic and anaerobic infection distribution was determined in mono microbial and polymicrobial infections. (Table 1). Most common cause of infection in group B was mixed aerobes and anaerobes (82.35%) while in group A cases mixed aerobes and anaerobes were commonly encountered (15.91%). This ratio of aerobe with anaerobe was highest in group A (8.26) than group B (7).

Predominant among the aerobes were *S. aureus* and *E. coli*. Mainly the anaerobes were *Bacteroides fragilis* & *Peptostreptococcus anaerobius*.

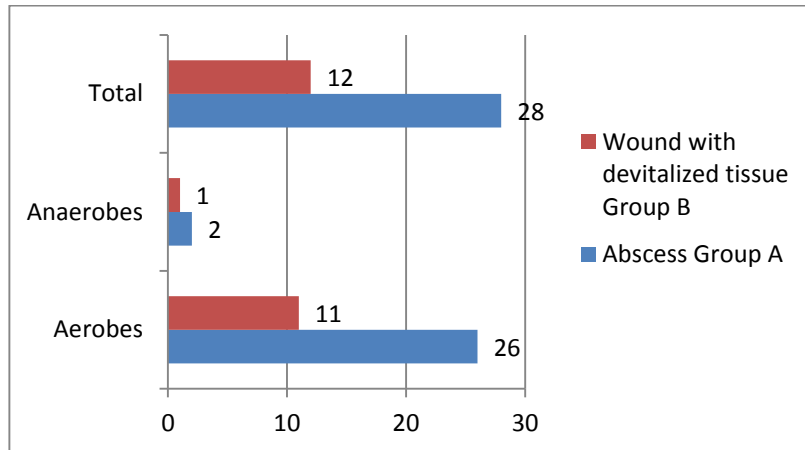
Table 1- Distribution of isolates obtained from surgical infection

	Group A	Group B
Total number of patients	52(100%)	18(100%)
Sterile	8(15.38%)	1(5.56%)
Culture positive	44(84.62%)	17(94.44%)
Aerobes	33(75%)	14(82.35%)
Anaerobes	4(9.09%)	2(11.76%)
Aerobes+Anaerobes	7(15.91%)	1(5.88%)
Monomicrobial	Group A	Group B
Aerobes	26(92.86%)	11(91.67%)
Anaerobes	2(7.14%)	1(8.33%)
Total	28(100%)	12(100%)
Polymicrobial	Group A	Group B
2 aerobes	4(25%)	1(20%)
3 aerobes	3(18.75%)	2(40%)
2 anaerobes	2(12.50%)	1(20%)
1Aerobes+1Anaerobes	2(12.50%)	1(20%)
1Aerobes+2Anaerobes	3(18.75%)	0(0%)
2Aerobes+1Anaerobes	2(12.50%)	0(0%)
Total	16(100%)	5(100%)

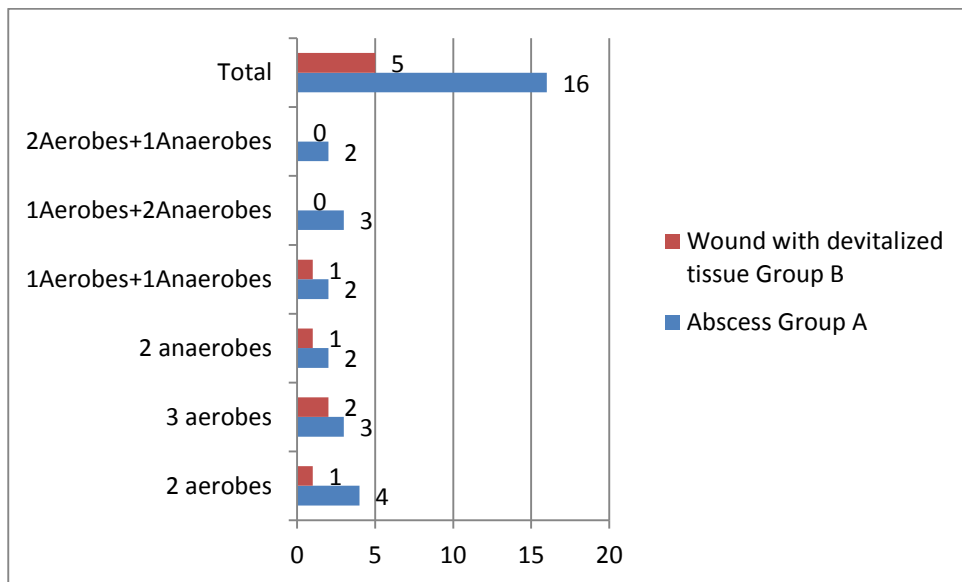
Graph 1- Distribution according to aerobes and anaerobes



Graph 2- Distribution according to monomicrobial



Graph 3- Distribution according to polymicrobial



## Discussion

Surgical infections were polymicrobial in nature as evident in abscesses & wounds with devitalized tissues. The pathogenic role of aerobic and anaerobic bacteria is recognized in better manner. This pathogenic effect may rise by microbial synergy with respect to severity of infection. Nutrients generated from one bacterium uplift the growth of pathogenic micro organisms cohabiting with them. Alterations in immune cell function of host by some anaerobes impart a competitive importance for them and cohabiting microorganisms [1].

Localized accumulation of inflammatory tissue which is purulent caused by suppuration which is deep within a tissue or organ is known as abscess. Cause of it may be deep seeding of pyogenic bacteria within that tissue. There is involvement of skin, dermis, fasciae, muscles, & bones. Abscess within cavities faces a threat for management to a great extent as treatment problem is faced with brain/pleural abscess etc[6]. In group A 8 were sterile out of 52 infections. Wounds & devitalized tissues are characterized by fast spreading edema, myositis, tissue necrosis & profound toxemia. Indirect derivation from soiled clothing, dust & even the air of a bad ventilated theatre [7]. In our study, 5 out of 18 (27.7%) group B infections were polymicrobial. Rising resistance with antimicrobial agent among anaerobic bacteria causes significant threat and in various studies multiple resistance is observed among anaerobes and also in aerobes [8]

### **Conclusion**

Surgical Infection is evident comparatively more in contaminated surgical wound instead of clean surgical wound. *Escherichia coli* & *S aureus* were mostly seen organisms leading to surgical infections. So better understanding of microbial pathogens common in our institute having epidemiological & therapeutic implications is seen in this study. Conduction of further researches considering this study as pilot is possible in future aspect.

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