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A study on bacteriological profile and Antimicrobial resistance pattern of Infected cancer patient at tertiary care hospital, Jaipur

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Abstract-
Purpose: *Cancer is one of the major cause of morbidity and mortality in developing countries in shote in spite of Vast advances in cancer treatment and infection remain a major cause. drug resistance is also a major concern to treat these infection.* ***Objective:*** *To determine bacteriological profile and susceptibility pattern of organisms causing infection in cancer patients.* ***Material and Methods****: A total of 70 appropriate samples collected from suspected infective cancer patients. These samples were processed for culture to find out possible pathogenic bacteria as per standard protocol. The antibiotic Sensitivity test was performed by modified kirby bauer disk diffusion techniques as per CLSI.* ***Results:*** *A total of 70 Cancer patients suspected with infection enrolled in our study among that 35 (50%) were positive for growth of bacteria and 35 (50%) were sterile. Out of 70 patients 44 (62.8%) were male and 26 (37.14%) were female among all the positive cases E. coli was the most prevalent 12 (34.28%) gram negative organisms showed highest sensitivity to colistin (84.21%), Non fermenter gram negative bacilli showed highest sensitivity to Minocycline (85.71%) while gram positive organism showed highest sensitivity to Minocycline and Chloramphenicol (88.8%).* ***Conclusion:*** *The constant evaluation of antibiotic Sensitivity pattern of bacteria isolated from infected patients for commonly used anti-microbial agents in a particular environment should be carried out regularly.*
Keywords: *antimicrobial susceptibility testing, Escherichia coli*

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I. Introduction

Cancers are one of the top global health issue and about 13% of all human deaths world wide. In spite of the vast advances made by medical science in cancer treatment infection remain a major cause of morbidity and mortality in patients diagnosed with cancer.[1] the cancer patients are immunocompromised because of the nature of the disease itself and also due to interventions in the form of chemotherapy, radiotherapy etc.[2] In addition there are usually other associated risk factors for acquiring infection such as long term catheterization, mucositis due to cytotoxic agents, neutropenia etc. The pathogens causing infection in cancer patients are *E. coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, Staphylococcus aureus, Acinetobacter, Enterococcus species.*

Treatment is often started empirically based on the local prevalence of organisms and susceptibility pattern. Drug resistance has been a common occurrence in infection in cancer patients specially in ICUs. Overuse and incomplete course of antibiotics as well as empirical antibiotic therapy have been the major contributing factors in the development of Multidrug resistant bacteria. Therefore this study is undertaken to determine the bacteriological profile and susceptibility pattern of organisms causing infection in cancer patient and to formulate guidelines for the empiric antibiotic treatment in our region.[3]

II. Material and Methods

A total of seventy samples were collected from suspected infection cancer patients from medical and surgical oncology units between May 2024 to January 2025 **Inclusion criteria** all cancer patient suspected of infections **Exclusion criteria** above patient did not give informed consent. All appropriate samples were received in laboratory in sterile container or as per hospital sample collection protocol from various clinical areas, these included blood, wound swap, sputum, urine, Bronchoalveolarlavage etc. All samples were processed as per standard microbiology laboratory operating procedures.[4] Isolates were identified by conventional method according to standard laboratory protocol, including colony morphology, gram staining and biochemical reactions up to species level.

Antimicrobial Susceptibility Testing

The antibiotic sensitivity test was performed by modified Kirby Bauer disk diffusion techniques with commercially available antibiotic disk according to Central Laboratory Standard Institute (CLSI) guidelines on Mueller Hinton Ager plates. The antibiotics which were used in our study were based on standard protocol of hospital and department policies in bracket (as per CLSI).

III. Result

A total of 70 samples from infected cancer patients were included in our study from April 24 to January 25. Out of them 35 (50%) were positive for growth and 35 (50%) were bacteriologically sterile. Out of 70 suspected infection cancer patients 44 (62.8%) were male and 26 (37.14%) were females. [Table No. 1]

Gender	No. of Isolates	Percentage (%)
Male	44	62.8%
Female	26	37.14%
Total	70	100%

Majority of the cases found in age group of 51 to 60 years (35 .7%) followed by 31 to 40 years (20%) and least was 1 to 10 year and 11 to 20 years age group. [Table No. 2]

S.NO.	AGE RANGE	No. OF ISOLATES	PERCENTAGE
1	1-10	0	0
2	11-20	0	0
3	21-30	3	4.28
4	31-40	14	20
5	41-50	12	17.14
6	51-60	25	35.71
7	61-70	11	15.71
8	71-80	6	8.57

Out of these 70 samples maximum were blood 29 (41.4%) followed by pus and wound swab 21 (30%), urine and sputum 7 each (10%) and least was body fluids 6 (8.5%) [Table No. 3]

Samples	Number of samples	Percentage
BLOOD	29	41.4%
URINE	7	4.4%
BODY FLUID	6	8.5%
PUS	21	30%
SPUTUM	7	10%
TOTAL	**70**	**100%**

Among all the positive cases in gram negative bacteria *E. coli* was most prevalent 12 (34.28%) followed by *Klebsiella species* 6 (17.14%) and *Pseudomonas aeruginosa* 5 (14.28%) similarly in gram positive bacteria *Staphylococcus aureus* was the most prevalent 5 (14.28%) followed by *Enterococcus* 3 (8.57%) [Table No. 4]

ORGANISM	NUMBER OF ORGANISM	PERCENTAGE
Pseudomonas aeruginosa	5	14.28%
Staphylococcus aureus	5	14.28%
E. coli	12	34.28%
Enterococcus	3	8.57%
Klebsiella spp.	6	17.14%
Burkhuld spp.	2	5.71%
Proteus vulgaris	1	3%
CONS	1	3%

Pseudomonas species and other non fermenters showed highest sensitivity to Minocycline 6 (85.71%) followed by Clindamycin 5 (71.42%) while the least sensitive was Ticarcillin 1 (14.28%) [Table No. 5]

S. No.	Antibiotics tested	Sensitive	Percentage (%)
1.	CAZ	3	42.85%
2.	CPM	2	28.57%
3.	PIT	2	28.57%
4.	TOB	3	42.85%
5.	CIP	4	57.14%
6.	LE	4	57.14%
7.	TCC	1	14.28%
8.	IPM	2	28.57%
9.	MRP	4	57.14%
10.	AK	4	57.14%
11	AT	4	57.14%
12	MI	6	85.71%
13	CL	5	71.42%

Gram negative fermenter organisms showed highest sensitivity to Clindamycin 16 (84.21%) followed by Ticarcillin 11 (57.89%) and Meropenem 11 (57.89%). They showed least sensitivity to Tigecycline (0%) [Table No. 6]

S. no	ANTIBIOTICS	SENSITIVE (N)	Percentage (%)
1	AMP	1	5.26
2	GEN	10	52.63
3	TOB	8	42.105
4	AK	9	47.36
5	TGC	0	0
6	PIT	8	42.10
7	CTX	3	15.78
8	CXM	4	21.05
9	CPM	4	21.05
10	CTR	2	10.52
11	CIP	7	36.84
12	LE	10	52.63
13	IPM	5	26.31
14	MRP	11	57.89
15	COT	6	31.57
16	CAZ	9	47.36
17	AT	4	21.05
18	TE	11	57.89
19	C	7	36.84
20	DO	10.	52.63
21	MI	9	47.36
22	CL	16	84.21
23	NX	1	5.26
24	NIT	3	15.78
25	FO	4	21.05
26	NA	2	10.52

Gram positive organisms showed highest sensitivity to Minocycline 8 (88.8%) and Chloramphenicol 8 (88.8%) followed by Linezolid 7 (77.7%) while the least sensitive was Cotrimoxazole (0%) and Ceftriaxone [Table No. 7].

S. no	ANTIBIOTICS	SENSITIVE (N)	Percentage (%)
1	AMP	1	5.26
2	GEN	10	52.63
3	TOB	8	42.105
4	AK	9	47.36
5	TGC	0	0

6	PIT	8	42.10
7	CTX	3	15.78
8	CXM	4	21.05
9	CPM	4	21.05
10	CTR	2	10.52
11	CIP	7	36.84
12	LE	10	52.63
13	IPM	5	26.31
14	MRP	11	57.89
15	COT	6	31.57
16	CAZ	9	47.36
17	AT	4	21.05
18	TE	11	57.89
19	C	7	36.84
20	DO	10.	52.63
21	MI	9	47.36
22	CL	16	84.21
23	NX	1	5.26
24	NIT	3	15.78
25	FO	4	21.05
26	NA	2	10.52

IV. Discussion

In this study 70 samples from suspected infection in cancer patients were processed out of which 44 (62.85%) were male and 26 (37.14%) were female and in accordance with **Worku.M.et all.** Out of 70 samples 35 (50%) were positive for pathogen and 35 (50%) were sterile and our finding is in accordance with **Kaya M. et all** In this study majority of the cases 25 (35.71%) were in 51 to 60 year age group followed by 14 (20%) cases belongs to 31 to 40 year age group and no patient belongs to 1 to 10 and 11 to 20 year age group and our results are inconsistent with **Savitha B C. et all** In this study majority of the samples were blood 29 (41.4%) followed by pus and wound swab 21(30%) and urine 7 (10%). Positivity among these samples highest were in pus samples 16 (45.7%) followed by blood 7 (20%), urine 6 (17.4%) and inconsistent with **Nazneen et al** The reason for low positivity amongst blood samples may be due to prior antimicrobial intake by patients during management of cancer.

V. Conclusion

Infection is major cause of morbidity and mortality in cancer patients. So this study plan to reduce such morbidity and mortality in cancer patient in this geographical area by determination of bacterial profile and their antimicrobial sensitivity pattern. This study highlights the need for the development of protocol for rational use of antibiotics and clinicians should be trained for importance of rational use of antibiotics. We recommend that constant evaluation of the antibiotic sensitivity pattern of pathogens causing infection in cancer patients for commonly used antimicrobial agents in a particular environment should be carried out regularly.

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